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DAVIS, CALIFORNIA

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TRANSACTIONS

OF THE

INDEXED.

KANSAS

STATE HORTICULTURAL SOCIETY,

(ORGANIZED IN 1869.)

CONTAINING

THE PROCEEDINGS OF THE FORTIETH AND FORTY-FIRST ANNUAL MEETINGS, TOPEKA, DECEMBER, 1906, AND DECEMBER, 1907; ALSO STATE HORTICULTURAL STATISTICS FOR 1906 AND 1907.

VOL. XXIX.

EDITED BY SECRETARIES WIILLIAM H. BARNES AND WALTER WELLHOUSE.

PUBLISHED BY THE STATE.

STATE PRINTING OFFICE,
TOPEKA, 1908.

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LETTER OF TRANSMITTAL.

ROOMS OF THE KANSAS STATE HORTICULTURAL SOCIETY.
STATE CAPITOL, TOPEKA, Feb. 15, 1908.

To Hon. E. W. Hoch, Governor:

We have the honor to present herewith the twenty-ninth volume of Transactions of the Kansas State Horticultural Society, containing reports of the fortieth and forty-first annual meetings, horticultural statistics of the state for the years 1906 and 1907, and such other papers as seem appropriate to promote the horticultural interests of the state. Respectfully yours,

EDWIN TAYLOR, *President.*
WALTER WELLHOUSE, *Secretary.*

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OFFICERS.

EDWIN TAYLOR, *President* ..... Edwardsville.
EDWIN SNYDER, *Vice-president* ..... Oskaloosa.
WALTER WELLHOUSE,* *Treasurer* ..... Topeka.
WILLIAM H. BARNES,† *Secretary* ..... Topeka.

ENTOMOLOGISTS.

PROF. E. A. POPENOE‡ ..... Manhattan.
PROF. S. J. HUNTER ..... Lawrence.

MICROSCOPIST.

PROF. BERNARD B. SMYTH ..... Topeka.

TRUSTEES.

First District, A. E. DICKINSON§ ..... Meriden.
Second District, C. V. HOLSINGER ..... Rosedale.
Third District, F. L. KENOYER ..... Independence.
Fourth District, C. C. COOK ..... Eskridge.
Fifth District, WILLIAM CUTTER‖ ..... Junction City.
Sixth District, J. J. ALEXANDER ..... Norton.
Seventh District, C. A. BLACKMORE ..... Sharon.
Eighth District, GEO. A. BLAIR ..... Mulvane.

HONORARY VICE-PRESIDENTS FOR LIFE.

JUDGE FRED. WELLHOUSE ..... Ex-President.
HON. J. W. ROBISON ..... Ex-Vice-president.

HONORARY MEMBERS FOR LIFE.

Bailey, Prof. L. H., Ithaca, N. Y.
Bohrer, Dr. G., Lyons, Kan.
Burrill, Prof. T. J., Urbana, Ill.
Campbell, W. G., jr., St. Joseph, Mo.
Colman, Norman J., St. Louis, Mo.
Evans, J. C., Harlem, Mo.
Forbes, Prof. S. A., Champaign, Ill.
Gano, W. G., Parkville, Mo.
Goodman, L. A., Kansas City, Mo.
Greene, Wesley, Des Moines, Iowa.
Hale, J. H., South Gastonbury, Conn.
Harrison, C. S., York, Neb.
Irvine, J. M., St. Joseph, Mo.
Johnson, Mrs. Geo. Y., Portland, Ore.
Jordan, Menzo, Champaign, Ill.
Kelsey, Prof. S. T. (the last of the original members), Saginaw, N. C.
Lantz, Prof. D. E., Manhattan, Kan.
Murray, N. F., Oregon, Mo.
Snow, Prof. F. H., Lawrence, Kan.
Waugh, Prof. F. A., Amherst, Mass.

Faculty of Kansas State Agricultural College, Manhattan, Kan., as follows:

The President.
Chair of Chemistry and Mineralogy.
Chair of Botany and Horticulture.
Chair of Zoology and Entomology.
Chair of Household Economy and Hygiene.
Chair of Industrial Art and Design.

Also, Chair of Entomology of the University of Kansas.

* Succeeded July 1, 1907, by E. G. Hoover, Wichita.
† Succeeded July 1, 1907, by Walter Wellhouse.
‡ Succeeded September 1, 1907, by Prof. T. J. Headlee, Manhattan.
§ Succeeded January 1, 1908, by F. W. Dixon, Holton.
‖ Succeeded January 1, 1906, by Prof. Albert Dickens, Manhattan.

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LIFE MEMBERS RESIDING IN KANSAS.

Alexander, J. J., Norton, Norton.
Bailey, Geo. W., Wellington, Sumner.
Barnes, William H., Topeka, Shawnee.
Barrett, L. T., Centralia, Nemaha.
Beckley, J. C., Springhill, Johnson.
Beebe, Mrs. Elizabeth, Columbus, Cherokee.
Blackmore, C. A., Sharon, Barber.
Blair, Geo. A., Mulvane, Sumner.
Booth, William, Winchester, Jefferson.
Bourne, D. M., Delphos, Ottawa.
Brazelton, John, jr., Wathena, Doniphan.
Brooke, A. L., Grantville, Shawnee.
Brown, Geo. E., El Dorado, Butler.
Buckman, A. H., Topeka, Shawnee.
Buell, D. G., Hiawatha, Brown.
Bullard, Mrs. C. W., Tonganoxie, Leav'th.
Bullard, H. S., Tonganoxie, Leavenworth.
Cecil, J. F., Topeka, Shawnee.
Chandler, M. E., Argentine, Wyandotte.
Coburn, F. D., Topeka, Shawnee.
Collings, G. W., Wichita, Sedgwick.
Cook, C. C., Eskridge, Wabaunsee.
Cook, Thos. F., Effingham, Atchison.
Cousins, John, Eskridge, Wabaunsee.
Cowgill, E. B., Topeka, Shawnee.
Crow, S. M., Topeka, Shawnee.
Curry, J. W., Winchester, Jefferson.
Dickens, Albert, Manhattan, Riley.
Dickinson, A. E., North Topeka, Shawnee.
Dickinson, S. S., Larned, Pawnee.
Diehl, E. P., Olathe, Johnson.
Dixon, F. W., Holton, Jackson.
Dobbs, J. D., Marion, Marion.
Eames, W. B., Delphos, Ottawa.
Entsminger, A. L., Silver Lake, Shawnee.
Ferris, H. L., Osage City, Osage.
Frank, A. N., Wathena, Doniphan.
Fulcomer, John, Belleville, Republic.
Geyer, Miss E., Leavenworth, Leavenworth.
Goble, Francis, Wallula, Leavenworth.
Graham, I. D., Topeka, Shawnee.
Gravatt, Henry C., Sabetha, Nemaha.
Graves, J. M., Effingham, Atchison.
Griesa, A. C., Lawrence, Douglas.
Griesa, A. H., Lawrence, Douglas.
Harris, E. P., Topeka, Shawnee.
Harrison, T. W., Topeka, Shawnee.
Harshbarger, W. A., Topeka, Shawnee.
Hibarger, J. D., Wichita, Sedgwick.
Holman, E. J., Leavenworth, Leavenworth.
Holsinger, C. V., Argentine, Wyandotte.
Holsinger, F., Rosedale, Wyandotte.
Holsinger, Geo., Argentine, Wyandotte.
Holsinger, G. L., Argentine, Wyandotte.
Hoover, E. G., Wichita, Sedgwick.
Huston, N. W., Fort Scott, Bourbon.
rwin, C. W., Wichita, Sedgwick.
Johnson, Mrs. V. M., Highland, Doniphan.
Jordan, J. S., Wakarusa, Shawnee.
Kenoyer, F. L., Independence, Montgomery.
Kern, H. H., Bonner Springs, Wyandotte.
Kline, C. A., Topeka, Shawnee.
Lake, John W., Waldo, Russell.
Lawrence, R. E., Wichita, Sedgwick.
Litson, W. H., Wichita, Sedgwick.
Longshore, J. S., Topeka, Shawnee.
Longstreth, C. H., Lakin, Kearny.
Lux, Geo. P., Topeka, Shawnee.
Lux, Phillip, Topeka, Shawnee.
Lux, W. L., Topeka, Shawnee.
Lyon, E. H., Udall, Cowley.
Maffet, Geo. W., Lawrence, Douglas.
Martindale, C. D., Caney, Montgomery.
McMaster, John, Eskridge, Wabaunsee.
McNicol, James, Lost Springs, Marion.
Meser, J. J., Hutchinson, Reno.
Miller, E. L., Topeka, Shawnee.
Miller, L. F., Perry, Jefferson.
Moeser, William, Topeka, Shawnee.
Moncrief, Jos., Winfield, Cowley.
Mosher, J. A., Rydal, Republic.
Myers, J. B., Eskridge, Wabaunsee.
Newlin, Wm., Hutchinson, Reno.
Newlon, W. Smithson, Oswego, Labette.
Oberndorf, A., jr., Centralia, Nemaha.
Pancoast, B. F., Ida, Allen.
Parker, Mrs. B. F., Haviland, Kiowa.
Perkins, J. S., Turner, Wyandotte.
Perkins, R. H., Turner, Wyandotte.
Phillips, B. A., Osborne, Osborne.
Popenoe, E. A., Topeka, Shawnee.
Porter, H. H., Pittsburg, Crawford.
Remsberg, J. E., Potter, Atchison.
Rhoades, Henry, Gardner, Johnson.
Richardson, G. C., Leavenworth, Leavenworth.
Ringle, W. E., Galena, Cherokee.
Robison, J. W., El Dorado, Butler
Rose, Geo. E., Rosedale, Wyandotte.
Rubart, Miss Lizzie, Ogden, Riley.
Rude, F. P., Topeka, Shawnee.
Schell, W. F., Wichita, Sedgwick.
Schlichter, J. B., Sterling, Rice.
Scott, A. E., McLouth, Jefferson.
Sharp, James, Council Grove, Morris.
Shoe, L. A., Highland, Doniphan.
Smith, A. B., Topeka, Shawnee.
Smith, B. F., Lawrence, Douglas.
Smith, W. W., Le Roy, Coffey.
Smyth, B. B., Topeka, Shawnee.
Snyder, Edwin, Topeka, Shawnee.
Sutton, A. H., Independence, Montgomery.
Taylor, Edwin, Edwardsville, Wyandotte.
Taylor, T. T., Hutchinson, Reno.
Thompson, J. A., Edwardsville, Wyandotte.

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LIFE MEMBERS RESIDING IN KANSAS — *concluded*

Tredway, J. T., La Harpe, Allen.
Underwood, W. H., Hutchinson, Reno.
Vandever, Geo. A., Hutchinson, Reno.
Van Orsdol, B. F., Topeka, Shawnee.
Wellhouse, Fred., Topeka, Shawnee.
Wellhouse, Walter, Topeka, Shawnee.
Wheeler, E. D., Wa Keeney, Trego.
Whitaker, Geo. P., Topeka, Shawnee.
Whitney, O. F., Topeka, Shawnee.
Williams, J. L., Kansas City, Wyandotte.
Williams, J. W., Holton, Jackson.
Willis, A., Ottawa, Franklin.
Wilson, A. V., Muncie, Wyandotte.
Wolverton, E. K., Barnes, Washington.
Yaggy, A. F., Hutchinson, Reno.
Yaggy, E. E., Hutchinson, Reno.
Yaggy, L. W., Hutchinson, Reno.
Yaw, Frank, Wichita, Sedgwick.

LIFE MEMBERS NOT RESIDING IN KANSAS.

Barnes, J. T., Hansen, Idaho.
Chandler, C. A., Kansas City, Mo.
Crowley, J. H., Rocky Ford, Colo.
Cutter, William, Palisades, Colo.
Daniels, E. T., Charleston, Okla.
Davidson, C. M., Huntington, W. Va.
Fosnot, W. E., Keosauqua, Iowa.
Gray, E. M., Durant, Okla.
Hitchcock, Prof. A. S., Washington, D. C.
Irvin, W. A., Springfield, Mo.
Milliken, Robt., Nampa, Idaho.
Munger, H. M., Costa Rica, C. A.
Newberry, H. J., Enid, Okla.
Snyder, Wm., Los Gatos, Cal.
Stephens, E. F., Crete, Neb.
Taylor, E. A., Houston Heights, Tex.
Wild, Henry N., Sarcoxie, Mo.

The following life members have moved from addresses given, and cannot be traced:

Abner, Allen, College Park, Cal.
Godfrey, A. N., Dayton, Wash.
Hall, M., Oklahoma.
Harris, F. B., White City.
Moser, M. R., Wichita.
Plank, Prof. E. N. (honorary), Kansas City.
Roberts, H. B., Perry.
Sheffield, C. H., Topeka.
Weidman, J., Oklahoma.

ANNUAL MEMBERS, 1907.

Cell, J., Topeka, Shawnee.
Daniels, A. T., Topeka, Shawnee.
Hibarger, N., Wichita, Sedgwick.
Hulse, Hiram, Topeka, Shawnee.
Huston, H. A., Chicago, Ill.
Mathewson, M., Topeka, Shawnee.
Mills, T. D., Topeka, Shawnee.
Pearsol, M. V. B., Yates Center, Woodson.
Shattuck, C. H., Topeka, Shawnee.
Skinner, J. H., North Topeka, Shawnee.
Smallwood, T. H., Fort Scott, Bourbon.
Truex, I. I., Delphos, Ottawa.
Vining, W. B., Quindaro, Wyandotte.
Weith, S. J., La Harpe, Allen.
Wellman, Felix, Topeka, Shawnee.
Wheeler, J. B., Oskaloosa, Jefferson.
Whitaker, E. J., Topeka, Shawnee.

DELEGATES TO FORTIETH ANNUAL MEETING.

Allen County Horticultural Society, J. B. Fergus, and S. J. Weith; alternate, J. T. Tredway.
Arkansas Valley Horticultural Society, Geo. A. Blair, and Geo. W. Hill; alternates, J. W. Farber, and I. T. Fahnestock.
Barber County Horticultural Society, C. A. Blackmore, and E. E. Blackmore.
Bourbon County Horticultural Society, T. H. Smallwood.
Manhattan Horticultural Society, A. J. Nicholson.
Leavenworth Horticultural Society, Milton Gilman.
Missouri Valley Horticultural Society, Mrs. Geo. E. Rose, and W. B. Vining.
Sedgwick County Horticultural Society, E. Bouton, and Marcellus Piatt; alternates, N. Hibarger, and T. McNallie.
Shawnee County Horticultural Society, E. B. Cowgill, and Miss Eva Harding.
Wabaunsee Horticultural Society, Mrs. J. B. Myers, and R. T. Reynolds; alternate, P. H. Parsonage.
Wathena Fruit Growers' Association, Geo. W. Kinkead, and W. K. Martin.
Wyandotte County Horticultural Society, Wm. Cady.

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ANNUAL MEMBERS, 1908.

Blanchard, Louis, Laneville, Labette.
Cunningham, J. C., Centralia, Nemaha.
Daniels, A. T., Topeka, Shawnee.
Dean, Geo. A., Manhattan, Riley.
Dean, H. G., Topeka, Shawnee.
Fager, C. C., Haysville, Sedgwick.
Gilmore, M. W., Topeka, Shawnee.
Harding, Dr. Eva, Topeka, Shawnee.
Hulse, Hiram, Topeka, Shawnee.
Miner, Geo. H., Hutchinson, Reno.
McClellan, C. K., Hays, Ellis.
Pelham, J. S., Hays, Ellis.
Smith, G. O., Topeka, Shawnee.
Skinner, J. H., North Topeka, Shawnee.
Whitaker, E. J., Topeka, Shawnee.

DELEGATES TO FORTY-FIRST ANNUAL MEETING.

Allen County Horticultural Society, J. T. Tredway, and J. B. Fergus.
Arkansas Valley Horticultural Society, Geo. A. Blair, and F. C. Shaffer; alternates, J. W. Furber, and T. J. Fahnestock.
Douglas County Horticultural Society, Samuel Reynolds, and Wm. Brown.
Missouri Valley Horticultural Society, W. G. Gano, and T. Lee Adams.
Sedgwick County Horticultural Society, M. C. Fager.
Wabaunsee County Horticultural Society, Mrs. Andrew Pringle, and Wm. Sharp.

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CONSTITUTION OF THE SOCIETY.

Approved and made effective at the thirtieth annual meeting, in December, 1896.

ARTICLE 1. This association shall be known as THE KANSAS STATE HORTICULTURAL SOCIETY.

ART. 2. Its object shall be the promotion of horticulture.

ART. 3. Its membership shall consist of, (1) honorary members, persons of distinguished merit in horticulture, elected by a majority vote of the Society; (2) life members, persons paying five dollars to the secretary at one time; and (3) annual members, persons paying one dollar to the secretary, membership of same to cease on the first day of the following annual meeting, unless renewed.

ART. 4. The legislative body of this Society shall consist of life members, two delegates from each auxiliary society, and annual members of one year's standing.

ART. 5. Its officers shall be a president, vice-president, secretary, and treasurer, elected by ballot at the annual meetings in even years. They shall serve for the term of two years, or until their successors are elected and qualified. No officer of this Society, excepting the secretary, shall succeed himself.

ART. 6. There shall be elected, biennially, a trustee from each congressional district, who shall serve for two years, or until a successor shall have been elected and qualified. No trustee shall succeed himself unless elected by a two-thirds vote. Trustees in even-numbered districts (congressional) to be elected in even numbered years, odd-numbered districts in odd-numbered years. The trustees, together with the president, vice-president, secretary, and treasurer shall constitute an executive board. The president, seretary, and treasurer shall constitute the executive committee.

ART. 7. The terms of its officers and trustees, excepting the secretary and treasurer, shall begin immediately on adjournment of the annual meeting at which they shall be elected; that of the secretary and treasurer shall begin July 1 following their election.

ART. 8. This Society shall hold its annual meeting in Topeka, during the month of December. Semiannual meetings may be held at such time and place as the executive committee shall determine.

ART. 9. The official seal of this Society shall consist of a circular disk, and shall contain thereon the following: "Kansas State Horticultural Society, 1869. *Ad astra per aspera.* Man's first occupation." With appropriate illustration.

ART. 10. This constitution may be changed or amended by a two-thirds vote of the members present at any annual meeting, provided such change or amendment shall have been submitted and read at the last preceding annual meeting.

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BY-LAWS OF THE SOCIETY.

As amended and adopted at the thirty-first annual meeting, 1897.

SECTION 1. It shall be the duty of the president to preside at all meetings of this Society and of the executive board, and perform such other duties as may devolve upon him.

SEC. 2. The vice-president shall in the absence or inability of the president perform the duties of said office.

SEC. 3. It shall be the duty of the secretary to keep a full record of the proceedings of this Society; to have charge of the official seal and keys of the Society's rooms, and full care of all books, papers, furniture, diplomas and other property pertaining to or belonging to this Society; also to represent this Society in all its correspondence. He may, by consent of the executive committee, appoint a deputy and employ necessary help; and shall receive all money due this Society, paying same (except state appropriation) to the treasurer, taking his receipt therefor. He shall encourage and assist in organizing auxiliary societies throughout the state, gather and record statistics, make a complete report of his office at each annual meeting, and compile annually a report of the transactions of this Society for publication.

SEC. 4. It shall be the duty of the treasurer to receive from the secretary all money (except state appropriation) belonging to this Society, and pay out the same upon order of the secretary, countersigned by the president. He shall keep an account of the funds in his charge, and make an annual report to this Society. At the expiration of his term, he shall turn over to his successor all books, accounts and moneys remaining in his hands or possession.

SEC. 5. It shall be the duty of the executive committee to assist the secretary in compilation of the report for publication; to perform the duties of the executive board between meetings; supervise the disposal of all money of this Society, and perform such other duties as the executive board may prescribe.

SEC. 6. The executive board shall have full control of all the affairs of this Society; shall appoint standing committees at the close of each annual meeting for the ensuing year on all subjects of interest to Kansas horticulture; each standing committee to make a written report, through its chairman, to the annual meeting following their appointment. A majority of the executive board may, by ballot, either by mail or in person, fill [for the balance of unexpired term only] any vacancy or vacancies that may occur in said executive board. It shall hold a board meeting on the day preceding the annual meeting, and again immediately after adjournment of the annual meeting.

SEC. 7. The offices of governor, lieutenant-governor, secretary of state, attorney-general, auditor, treasurer and superintendent of public instruction are hereby made *ex officio* members of this association.

SEC. 8. By a two-thirds vote of the members present at any annual meeting, these by-laws may be changed or amended.

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PROCEEDINGS

OF THE FORTIETH ANNUAL MEETING AND FRUIT DISPLAY OF THE KANSAS STATE HORTICULTURAL SOCIETY, DECEMBER 27-29, 1906, IN THE ROOMS OF THE SOCIETY IN THE STATE CAPITOL, TOPEKA, KAN.

FIRST DAY—MORNING SESSION.

DECEMBER 27, 1906.

During the morning the trustees held a short business session.

AFTERNOON SESSION—2:00 P. M.

The Society was called to order by the president.

Invocation by Rev. Frank Lynch.

The Society joined in repeating the Lord's prayer, and in singing "America."

PRESIDENT HOLSINGER: We will hear the reports of trustees.

REPORT OF FRUIT CONDITIONS IN FIRST DISTRICT.

By A. E. DICKINSON, Trustee, Meriden.

From reports, by counties, of reliable horticulturists, and from personal inquiry, observation and experience, the following report is made:

The season of 1906 has been peculiar in general, wet very early, very dry later, with good rains still later. Rains generally local; so much so, in fact, that sections lying near to each other had very different conditions. Reports show that early conditions were good to extra good, and that the crop in general has been better than for several years.

Apples, 25 to 100 per cent.; full crop generally reported.

Pears, light to full.

Plums, natives full, others light.

Cherries, 75 to 100 per cent.

Blackberries, 75 to 100 per cent.

Dewberries, 20 to 100 per cent.

Raspberries, generally poor; a few 100 per cent.

Strawberries, 25 to 100 per cent.

Gooseberries and currants, 100 per cent. by all reporting.

Grapes, 15 to 90 per cent.

Little injury reported resulting from fungous diseases except from apple-scab, not serious. The principal insect injury reported was done by codling-moth, which affected as high as 85 per cent. Birds did but little injury, and insect-eating birds have attracted little attention.

Interest in spraying seems to be on the wane, only one county reporting interest increasing, with fifty per cent. of orchardists spraying; others said very few.

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The few past unfavorable seasons seem to have had a depressing effect on fruit raisers, very little planting being reported; one county only reporting increasing interest.

Very little attention is being paid to the planting of forest-trees; in fact, Nature herself seems to be attending to that work pretty effectually.

Reports as to prospects for crop the coming season are wholly favorable.

The careless habit of many farmers in allowing their orchards to become breeding places for noxious insects and fungous diseases, the scarcity of labor, and the low price of fruit to producer with high price at same time to consumer, are discouraging features to the horticulturist. In some parts of the district efforts have been made to remedy the last named by co-operative efforts in selling, with varying degrees of success.

From the reports I do not get data that would seem to justify me in trying to designate the most desirable varieties of fruits of the various kinds.

REPORT OF FRUIT CONDITIONS IN THE SECOND DISTRICT.

By E. P. DIEHL, Trustee, Olathe.

Ninety per cent of the fruit-buds were alive in the spring. The blossoming was very good; about 90 per cent. set, and perhaps 85 per cent. hung on the trees.

We picked 75 per cent. of a crop of apples—Janet 100 per cent; pears, 86 per cent.; peaches, 90 per cent.; plums, 50 per cent.; cherries, 100 per cent.; blackberries, 75 per cent.; dewberries, 30 per cent.; raspberries, 75 per cent.; strawberries, 30 per cent.; gooseberries, 25 per cent.; currants, 25 per cent.; grapes, 75 per cent.

Our best apples were Jonathan, Gano, Winesap, Grimes, Janet, York, Maiden Blush, Early Harvest. Willow Twig rotted on the trees.

The most troublesome insects were codling-moth and canker-worms.

While spraying is considered a success, it is not practiced much.

Our insect-eating birds are decreasing, although we try to protect them.

No large orchards were planted during the past year. Interest in horticulture is not increasing.

Birds damaged fruit very little with us.

Forest-trees are not being planted much.

The general condition of trees, vines and bushes is good. Pear orchards are failing; peaches did well; apple crop good, prices low.

REPORT OF FRUIT CONDITIONS IN THIRD DISTRICT.

By F. L. KENOYER, Trustee, Independence.

The blank statistical reports furnished me by our secretary, Mr. Barnes, were sent out to persons supposed to be interested in fruit growing in each county of the third district, which includes Cowley, Elk, Chautauqua, Wilson, Montgomery, Neosho, Labette, Crawford, and Cherokee—nine counties in all—occupying the southeast corner of the state. Although the blanks were accompanied by self-addressed stamped envelopes, only three were filled out and returned to me. So you see what a poor basis I have for a report from my district; also, how little interest is taken in horticulture. Two of the reports received were from Labette county, the other from Cowley county.

The reports from Labette county show that much less attention is paid to fruit growing than formerly. But little spraying is done, and in consequence the tree-fruits were greatly damaged by insects and fungi, resulting

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in a poor crop of inferior fruit. But few trees are being planted, and little interest is taking in commercial orcharding.

The conditions prevailing in Labette county fairly represent the entire eastern and central section of the district. Here the soil is better adapted to small-fruit growing and general farming than to commercial orcharding. Here nearly every farmer plants a few fruit-trees and then leaves them to their fate. Those that escape the ravages of rabbits and borers will in due time produce a small crop of gnarly fruit and an immense crop of worms and lice and moths and bugs and blights and scabs and rot and mildew, which soon migrate to the more favorable fruit sections and make life miserable to the commercial orchardist.

The western section of this district embraces a part of the famous Arkansas Valley fruit belt. The report from Cowley county states that spraying is generally practiced there and full crops of apples and pears were harvested. The codling-moth was the worst enemy to the fruit.

A great many fruit-trees were set last year, and there will be many more set of all varieties next spring. The people as a rule are very enthusiastic over fruit growing.

The entire third district seems to be well adapted to small-fruit growing. Last season strawberries were injured in some locations by late frosts and in others by drought, so that for the entire district about a half-crop of berries was picked. Most of the berries were unusually fine in size and quality. An immense crop of blackberries was picked, perhaps the largest crop in the history of the country. Raspberries did only fairly well, some of the buds being injured by frost in April. Grapes and peaches each matured about seventy-five per cent. of a crop. All kinds of fruits and garden products brought good prices in the home market, especially so in Montgomery county, with its numerous factories and its large and rapidly increasing urban population.

The berry fruits, including grapes, are in the best of condition for a full crop next season. The demand for plants is unusually heavy, indicating that there will be an increased acreage set to small-fruits in the spring.

REPORT OF FRUIT CONDITIONS IN THE FOURTH DISTRICT.

By JOHN COUSINS, Trustee, Eskridge.

The spring condition of buds was O. K.—the best for three years; the crop of blossoms extra good; too many fertilized. Seventy-five per cent. of the fruit hung on and we picked as follows: Apples, 65 per cent.; pears, 75 per cent.; peaches, 25 per cent.; plums, 90 per cent; cherries, 75 per cent; blackberries, 90 per cent.; dewberries, 100 per cent.; raspberries, 25 per cent.; strawberries, 90 per cent.; gooseberries, 10 per cent.; currants, 75 per cent.; grapes, 15 per cent. (affected by dry weather).

All fruits, excepting quinces, do well in this district if taken care of.

Bitter rot damaged apples 25 per cent. Blight was bad on pear trees.

Of insects, we had numerous canker-worms, and the codling-moth did 50 per cent. damage.

Spraying, which is successful, is only practiced in a limited way.

Quails, doves, blackbirds and other insect-eating birds nest with us and are increasing; we try to protect them. They may have damaged a little fruit this year.

Trees, vines and bushes entered the winter in good condition.

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REPORT OF FRUIT CONDITIONS IN THE FIFTH DISTRICT.

By WILLIAM CUTTER, Trustee, Junction City.

Fruit-buds in spring were good, and bloomed out heavy; a fair crop set, of which about 50 per cent. hung on the trees. We picked as follows: Apples, 50 per cent.; pears, 30 per cent.; peaches, 80 per cent.; plums, 50 per cent.; cherries, 60 per cent.; blackberries, 80 per cent.; dewberries, 40 per cent.; raspberries, 50 per cent.; strawberries, 70 per cent.; gooseberries, 80 per cent.; currants, 50 per cent.; grapes, 50 per cent. of a full crop.

Our best fruits are apple, peach, cherry, blackberry, and strawberry.

We had some blight on pear trees.

Of insects we had leaf-roller on strawberries, and codling-moth on unsprayed apples.

Few spray in the district; it is successful when properly done.

We have nearly all varieties of insect-eating birds, and they are increasing; we try to protect them.

Less fruit-trees than usual were planted in 1906. Interest in horticulture does not seem to increase any.

No forest-trees were planted.

Field-mice did some damage in grassy orchards.

REPORT OF FRUIT CONDITIONS IN THE SIXTH DISTRICT.

By J. J. ALEXANDER, Trustee, Norton.

Another year has come and gone. We have reached the fortieth milestone in our history—the "ruby" anniversary of our organization.

Of all the years of our existence this has been the very best. Our blessings have been almost without number. The horn of plenty has surely been poured out on us in so many ways we can scarcely number them, and I fear we do not rightly or fully appreciate them.

The season commenced very favorable, with the exception of a cold spell in March that killed the peach-buds in some localities, but almost everything has done finely.

The first fruit to come in the late spring was the strawberry, which was good, the fruit being extra fine.

Then came the cherries, which were excellent and clear of stings and worms. The Early Richmond took the lead, the Montmorency second. The Heart cherry is not a success in the West.

The peach commenced about the middle of July with Alexander. All of the early varieties were good and practically free from worms. The Champion and Stump were good; next were Crawford Early and Crawford Late, and Crosby. The Elberta was not a good crop in the sixth district; they seem too tender in bud. Seedling peaches made a good crop, but were of no commercial value. All peaches were of good form and fine flavor.

The plum was good and clear of curculio, and of fine flavor. Elwood still has the lead. For me they have never been affected with curculio. Their season is about September 1. The Weaver, Wolf, Miner, and Forest Garden, were all good this year; in fact, all of the European and native varieties were fine. The Japans are too early in bloom for the northwest part of the state.

The berry crop was good in the east and south parts of the district. The gooseberry gave a full crop, of which the Downing and Houghton were the best bearers.

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Grapes were good and yielded a bountiful crop. Concord is in the lead. There will be a very heavy planting of grapes in the spring of 1907.

The apple is still gaining prestige in the sixth district. We had some of the very finest apples at our county fairs this fall, and almost all varieties are doing well, and there will be a very heavy planting of apple trees in our section of country the coming spring; in fact, there will be more trees of all kinds planted next year than ever before. The people are gaining confidence in this country along lines of fruit growing because of the more favorable conditions, there having been more rainfall in the last five years. The rainfall for this last season, from April, is as follows:

April	5.18	inches.
May	.39	"
June	1.24	"
July	2.44	"
August	2.30	"
September	.50	"
October	3.27	"
November	.42	"
Total	15.74	inches.

This is from the government gage, so you see the rainfall has been such that we have had an exceptional season, and the people are greatly encouraged; everything has made a splendid growth and gone into winter in good shape, well matured. The fruit-buds are all in good shape at this time. I have examined all varieties and find none hurt.

We have been comparatively clear of all pests this year. The canker-worms have not molested us to speak of for two years, and we have had scarcely any blight. Take it all together we have been more than prosperous, and our hearts swell with gratitude to the Almighty Father for all His blessings and mercies toward the big sixth.

I have failed to get returns from reports sent out that will be of any value, but as I am in the north center of this district I am giving the best report I could gather. They don't seem to have time to make up and send in reports for their counties. Despite the indifference of the people to report, we can plainly see that the northwest part of the state is making great strides in advancement in all branches of industry, and we feel greatly encouraged in our progress in the fruit industry, and in all kinds of trees and shrubs and flowers, for they are surely fine, and there never was a time when the people had as much fruit in their cellars as at this time, and never was fruit better; but the end is not yet, as I believe there are greater things in store in the future for the great Northwest if we can only be induced to stop and count our "blessings" and not forget to give reverence and glory to the Great Creator for all His benefits.

REPORT OF FRUIT CONDITIONS IN THE SEVENTH DISTRICT.

By C. A. BLACKMORE, Trustee, Sharon.

The condition of the fruit-buds the first of the year was very good, and remained good in the spring. The crop of bloom was heavy on all kinds of fruit-trees except Japan plums, which had very few blooms. The crop of fruit set, compared to the amount of bloom, was from 10 to 50 per cent. Heavy wind-storms from the west the latter part of April, when the apple was in bloom, damaged the apple crop on the west side of the trees very

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greatly. The amount of fruit hanging on the trees until maturity was one-seventh of 1 per cent. in Rice county, 10 to 90 per cent. in Reno county, and 25 per cent. in Barber county. Amount of apples harvested was 100 per cent. when thoroughly sprayed, 25 per cent. when half sprayed, and 1 per cent. when not sprayed at all. We harvested 100 per cent. of pears in Barber county, but found no pears outside of Barber county. Of peaches 75 per cent. of a full crop was harvested. Plums were a failure, except the Wild Goose and Chickasaw families, which yielded about 50 per cent. Cherries were a full crop in Barber county, 75 per cent. in Rice county, and 10 to 25 per cent. in Reno county. Blackberries, 100 per cent. in Barber county, 100 per cent. in Rice county, and 50 per cent. in Reno county. Dewberries, 100 per cent. in Barber county. Raspberries, 25 per cent. in Reno county, 100 per cent. in Rice county, and 100 per cent. in Barber county. Strawberries, 75 per cent. of a full crop. Gooseberries, 100 per cent. in Barber county. Grapes were 80 per cent. of a full crop in Reno county, 100 per cent. in Rice county, and 100 per cent. in Barber county.

Best varieties of fruit.—Apples: Mammoth Black Twig, Minkler, Winesap, Missouri Pippin, Grimes' Golden, Jonathan, Gano, Ben Davis, York Imperial. Peaches: Alexander, Triumph, Greensboro, Foster, Early Crawford, Late Crawford, Stump, Crosby, Salway, Henrietta, Heath Cling, Mammoth Heath, Carmen, and Champion. Plums: Abundance, Burbank, Gold, Wild Goose. Pears: Duchess, Kieffer, and Garber. Cherries: Early Richmond, Montmorency, and English Morello.

The ravages of rot, blight and other fungous diseases are getting quite bad. The curculio is at work some, and the codling-moth will soon put us out of business if we persist in our sprayless work. About twenty-five per cent. of our fruit growers are spraying their fruit-trees, with good results. When spraying is properly done it is entirely satisfactory.

We have many insect-eating birds, which are not protected as they should be; but I think they are increasing. Birds have damaged the fruit but very little; nothing to compare with the good they do.

Fruit-trees were planted quite extensively last year, and the same this year. Our people are taking more interest in their fruit plants now than ever before, especially as to spraying.

All kinds of fruit-trees and vines are going into winter quarters in the best of condition.

Forest-trees are being planted quite extensively, and I believe this to be one of the greatest redeeming factors that our people can engage in.

REPORT OF FRUIT CONDITIONS IN THE EIGHTH DISTRICT.

By GEO. A. BLAIR, Trustee, Mulvane.

The general condition of fruit-buds was fine over the eighth district up to January, 1906. The condition of fruit-buds and trees in the spring of 1906 was good, except in the locality of Peck, Sumner county, and a section in McPherson county, and in Sedgwick county, near Wichita, where the summer and fall varieties of apples were damaged in bud. With these exceptions the crop of blossoms was large to very large.

The crop of fruit set as compared with the crop of blossoms ranges from 10 to 40 per cent. in apples, 60 per cent. in peaches, 75 per cent. in cherries, in Harvey county; from 20 per cent. to a full crop of apples, 50 per cent. on peaches, 25 per cent. on apricots, in Butler county; a good

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average and fair set of fruit in McPherson county; 50 per cent. in Sedgwick county; 58 per cent. in Sumner county.

The percentage of fruit set which hung on the trees and matured is reported as 15 in McPherson, 45 in Harvey, 37 in Butler, 75 in Sedgwick, and 56 in Sumner counties.

The percentage of apples picked varies from 15 in McPherson, 37 in Harvey and 37 in Butler, to 50 in both Sedgwick and Sumner counties.

The pear shows a yield of 30 per cent. of a crop in Butler, 50 per cent. in McPherson and Sedgwick, 57 per cent. in Sumner, and 75 per cent. in Harvey counties.

Peaches yielded 56 per cent. of a full crop in Sumner county, 60 per cent. in Sedgwick and Butler counties, 66⅔ per cent. in McPherson and 70 per cent. in Harvey counties.

Plums gave 40 per cent. of a crop in Butler county, 50 per cent. in Sumner, 80 per cent. in Sedgwick and Harvey, and a full crop in McPherson county. This report in Sumner and Sedgwick counties applies to Wild Goose and the native plums only, the Japan plum having been badly injured by frost.

Cherries were damaged by frost in the low lands throughout the eighth district. McPherson county reports no yield, Butler 45 per cent., Sumner 48 per cent., Sedgwick 50 per cent., and Harvey 80 per cent.

Blackberries, 80 per cent. of a crop in Sumner and Sedgwick counties, 83 per cent. in Harvey, and 87 per cent. in Butler county.

Dewberries gave Sedgwick county 47 per cent. of a crop, Butler 60 per cent., and 40 per cent. in McPherson county.

Raspberries bore 20 per cent. of a crop in Harvey, 70 per cent. in Butler, 75 per cent. in Sumner, 80 per cent. in Sedgwick, and a full crop in McPherson.

Strawberries were damaged by a freeze, yet yielded in Sedgwick county 50 per cent. of a crop, in Butler county 60 per cent., in Harvey 70 per cent., and in McPherson and Sumner counties 80 per cent.

Gooseberries are reported as giving 70 per cent. of a crop in Harvey and Butler counties, 75 per cent. in Sedgwick, and 80 per cent. in McPherson county.

Currants were a light yield of 10 per cent. in Sedgwick, and 25 per cent. in Harvey county.

Grapes on lowlands were badly frozen after the foliage had started. Reports from Butler county state a yield of 18 per cent., Sedgwick 20 per cent., McPherson 37 per cent., Sumner 65 per cent., and Harvey 80 per cent.

Apple, peach, plum, cherry, pear, grape and berries all do well and are extensively grown in the eighth district.

Apple-scab, rot, and blight, together with codling-moth, curculio, and woolly aphis, are present over the entire district. In Butler county the canker-worm, web-worm and tent-caterpillar are reported. In Sedgwick county canker-worm, skeletonizer and a small green katydid have been depredating. The last-named insect is thought to be responsible for the small saucerlike cavities found in the apple about the time it gets its color and on up to picking time.

The reports on spraying state that it is not practiced in McPherson county, but in Harvey a little, and with some success; in Butler it is used, with but little success; and in Sumner and Sedgwick counties it is practiced to some

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extent, with varied results. In the two last-named counties its use is increasing.

Our insect-eating bird friends which nest with us are reported as the quail, blackbird, catbird, king-bird, thrush, robin, mocking-bird, wren, and oriole. Some few fruit growers protect them, others are indifferent to them, and some kill them. The damage done fruit by birds is too small to estimate in Harvey, McPherson and Butler counties, while Sedgwick and Sumner counties report a five-per-cent. damage.

A few apple trees were planted this year. People in Sumner, Sedgwick and Harvey counties are taking more interest in horticulture than formerly.

The condition of fruit-trees, vines and bushes is reported fine for going into the winter.

Very little interest is taken in planting forest-trees, throughout the district, except around buildings and in towns.

A frost visited the lowlands in this district about May 9 last, when grapes and berries in bloom were killed, and in some localities the unopened buds also. In some sections the grapes cast second blooms, but these were few.

Reports from Butler county state that apples the size of peas were killed on the lowlands.

Before closing, I wish to call to mind the fact that our insect-eating birds are decreasing; that our insect pests are increasing; that the birds are our friends, are poorly protected, and often ruthlessly destroyed by the horticulturist himself. Again, that spraying is but little practiced in this district and with varied results.

PRESIDENT HOLSINGER: We will now hear from the state at large and from such districts as feel that they have not been fully or satisfactorily represented.

EDWIN TAYLOR: I would like to have Mr. Blair say what he means when he says spraying met with varied results in his district.

GEO. A. BLAIR: I wanted to convey the idea like this: As I learned from reports made on blanks and from what I personally know, those people who practice spraying at the right time say the results were very satisfactory. Those who did not, got no satisfactory results. Some say it did no good whatever. I have been over the ground myself and know that was the experience. It was mine. When I first began spraying I took all the information I could from the papers. Some people told me I ought to spray from three to four times with intervals of ten days. I practiced that and could not see that it did much good. Rain came and I quit spraying; the result was I lost the important time to put spray on to protect the fruit. I have since learned by experience and from authorities that if I spray as soon as the petals form I will get results, and within ten days I consider it too late to do effectual spraying. After that time the bud has grown shut and all your spray is on the outside; but before that, whatever you get into the calyx is locked there for the season and is a protection. In making my report I desired to convey the idea that where done properly and in season the results were satisfactory. Those who had approximated the time and the manner were satisfied in proportion to the condition of work done.

EDWIN TAYLOR: Mr. President, I think that is a very pregnant and important reply Mr. Blair has made. I have never known a gun that was held responsible if it was not pointed right and did n't hit the mark. I

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don't suppose spraying should be held responsible for failure if it is not properly done. The thing is, is it effectual if it is properly done?

FRANK YAW: I will say, as Mr. Blair says, that spraying is effective if it is done at the proper time. There are only four or five days we can spray [the first time] to do any good. I sprayed my apples twice and I harvested seventy per cent.

PRESIDENT HOLSINGER: Please remember, gentlemen, that we are not now discussing spraying, that is on the program for to-morrow.

PROFESSOR DICKENS: At the Experiment Station we had the best fruits we have had for sixteen years; we had good crops of all fruit except apricots. There were some varieties of peaches that were hurt in bud; American and Bell of Georgia were among the best that we had this year. The crop of grapes was very good. My own plantation is just about a quarter of a mile from the Experiment Station, and my first shoots were all killed by frosts. The Experiment Station is perhaps thirty or fifty feet higher and was very slightly damaged. Taken on the whole, the ground about our section of the state is lower ground. The vineyards were injured very seriously. Most of them put out a light crop of second bloom. Some of the vines had a pretty bad dose of black rot and brown rot, and that considerably injured fifty per cent. of the apple crop. To get right back to that spray question again—it seems to me that the apple question and the spray question are pretty nearly identical. We had a good crop of apples, and thousands of bushels of apples that went to waste on the ground, but first-class apples have made good money for those who have grown them this year. We had the best fruit season, taking it from strawberries to winter apples, that we have had in all my experience at the Experiment Station. In the native fruits papaws were only a light crop, but the persimmon crop was especially good.

FRANK YAW: Is there a law, or has there ever been a law passed to compel the fruit farmer or fruit grower to spray his trees to destroy insects?

SECRETARY BARNES: There is none on the statute-books.

PRESIDENT HOLSINGER: We will proceed with the program. Communications and announcements.

SECRETARY BARNES: There are a number of communications here which are quite lengthy. I will state what they are about in a general way, and if it is desired that the entire communication be read it can be easily done. One is in regard to the shipping of apples from this country to foreign ports. The American Apple Shippers' Association gets out a long circular and desires the matter brought before this Society.

The secretary read the communication.

SECRETARY BARNES: The next communication is from a Mr. Marshall about commission men.

MR. HOLMAN: I will state here that I met Mr. Marshall. He is a railroad man engaged in fruit growing; has quite an orchard in Missouri. He has had some experience with commission men that has been unpleasant. He is of a positive character. Railroads when they run up against obstructions remove them. He has had that same disposition toward commission men whom he thinks don't do right. So his purpose is to remove them. I don't know whether he sent a copy of the proposed law that has been formu-

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lated for the purpose of catching the wily, irresponsible commission man or not, but it is something to that end that he proposes, and he wants the cooperation of this Society and the fruit men generally.

PRESIDENT HOLSINGER: I would ask whether the gentleman in his article does not set forth what his wants are? I think we will find something in the article, although I have not seen the one which the secretary has in his possession. I will say that we have had communications from the Missouri Valley, and also from the Missouri State Society, and they have all been in accord with Mr. Marshall's letter, and I believe the Society would be glad to hear what Mr. Marshall has to say. The secretary will please read Mr. Marshall's letter.

The secretary then read the following letter:

"LEAVENWORTH, November 21, 1906.

"*William H. Barnes, Topeka, Kan.:*

"DEAR SIR—I am now writing you on a subject that I consider of vital importance to the apple growers and also to all fruit and produce growers in the United States. It is to get a law passed protecting those that ship on consignment from dishonest commission firms and persons handling fruit and produce on commission. As it is now we are perfectly at the commission firm's mercy. We ship to a distant market, and in a month or so we get back a slip of paper printed 'account sales'; so much money received, less commission—nothing to show what was spent in disposing of shipment, such as freight charges, expressage, drayage, switching, car service, commission, or anything else. When you write for these the commission house simply ignores you. My idea is to ask the next session of congress to pass a law making the commission houses attach to every 'account sales' a voucher showing exactly how every cent is spent—that is, a receipt for every item; also to remit within five days from time that shipment is disposed of, and also, if they do not do this they are liable to a fine of $250 on each and every case, or to six months in the penitentiary. As it is now the fruit commission business is the biggest graft in the United States and a curb should be put on it. Won't you write each of your members and ask them to write their congressman good strong letters asking for this legislation? It certainly is very badly needed. And won't you get your Society to go to the President direct with it? I have gotten the Missouri society to take it up, and will try and get every society in the United States interested. Please write me your views and if you will take action. Yours truly,

ELLIOT MARSHALL."

PRESIDENT HOLSINGER: Will Mr. Wilson, secretary of the Missouri Valley Horticultural Society, come forward and tell us of his experience. He also has a paper on this subject.

MR. WILSON: Possibly the best way to explain Mr. Marshall's matter is to read his experience as given in a letter I have with me. If the Society will hear that it will probably give you the experience of all of us.

J. L. WILLIAMS: Mr. President, one thing that appeals to me in this matter is this: It is an utter impossibility for us to pass any law that will make a dishonest man honest. It is possible to throw around him some restraint that will cause him to make statements—as far as the slips of paper for freight bills go—but when it comes to putting down figures for what he has spent and what he has received, that lies entirely in his power, and it is pretty hard for me to understand how we can legislate the commission man into being honest. I want to say this, however, for some of the commission men—that there are some mighty good, straightforward, honest commission firms, and I have dealt with them. I have also come across crooks. I am

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sorry to say that I believe there are more crooks than honest men in the commission business. If we could only locate the honest ones we would be all right. An honest commission man will send you the receipt and itemize the various articles in your car and what they sold for. Let us give credit to some of them for being honest.

PRESIDENT HOLSINGER: Mr. Taylor was appointed by the Missouri Valley association on the committee to investigate the matter. We will hear him.

EDWIN TAYLOR: Mr. President, I didn't want to serve on that committee and didn't do much; like Brother Wilson, I don't know how you are going to control the commission man by law. He doesn't need any law if he is straight, and if he is not straight the law will not hold him. What are we going to do about it? I notice many of you here are either gray or bald, and I know very well what made you so. A part of it at least comes from the troubles you have had in the market, one way or another. But you are more to blame yourselves than anybody. I am a little gray myself. Now, we are the only real honest people—all of us are honest—there are. The commission men are probably worse; they have some crooks among them.

A. E. DICKINSON: I agree with what has been said. I have had some experience along that line both ways, and I will say that all commission men are not honest, and we can never legislate to make them honest. But you can find the honest commission men. The average farmer who has but little to ship can hardly go to the expense, and I believe there is only one help, and that is cooperation—a subject which will come up later. I had a little experience in shipping fruit for an association, and we had an arrangement that made it obligatory on the commission firms to make the returns for each individual shipper, and some growers' fruit brought nothing, and other growers' fruit brought high prices. So you see it is not alone the commission men.

GEORGE W. MAFFET: I think we ought to shake up our old bones. If we can pass a resolution, or do anything that would agitate, I am in favor of agitation along that line.

E. B. COWGILL: As this seems to be a sort of an experience meeting, I may state some experiences that may be of interest. Some years ago a commission firm in Topeka advertised in the *Kansas Farmer*. The transaction was satisfactory on our part. Pretty soon we had a letter from somebody complaining of the treatment received on a shipment of potatoes to this firm. In a few days a letter came from some one else complaining of treatment and lack of returns. We immediately took the matter up with the commission men and returns were speedily brought about. The advertisement thereafter was declined by the *Kansas Farmer*. The contract was made by our advertising agent, and the money paid for advertising in the *Kansas Farmer*. The agent brought him in supposing him to be all right. The advertisement was withdrawn and the money returned. That is one Topeka commission concern. I was at the joint meeting with the Missouri Valley and Douglas County Horticultural Societies in Lawrence last summer, and was much pleased with the report made about another commission firm. More than one fruit grower told about having shipped, when he could do nothing else, to a commission firm, and returns were all satisfactory, that commission concern being a member of the State Horti-

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cultural Society. So the commission men are not all rascals, and if shippers can find means of getting information they can find men to whom it is safe to ship, and who will make returns that will be correct and honest. I don't know of any rule whereby you can find out, but the business world is fairly well organized for ascertaining the rascal, and it is one of the points I think fruit growers are not much accustomed to using; that is, to avail themselves of the usual commercial channels for that kind of information. You can get a first-class exposure of the rascals through these channels.

PROF. DICKENS: I heard the commission man's side of the story this morning as I came down, from a man who has shipped hundreds of cars of stuff over the Union Pacific from St. Marys west, who summed up in a few words the things we are trying to do by cooperation. He said, "if you can just get the honest men together you can do the business satisfactorily." He told me he had this fall shipped a car of sweet potatoes to Pueblo. It happened that he was in Pueblo when the potatoes got there. He said he sorted out seventy-five barrels of unmarketable sweet potatoes from that one car. It seems to me that it is the duty of the shipping association to get the honest men together. The fruit man whose stuff is not up to grade damages his neighborhood and his association and damages the business at the other end. We can, of course, pass resolutions against stealing, but it would not do very much good to the commission man. The idea to have the farmers in a community get the honest men together and deal with the honest men seems to me to be the whole thing.

A. L. BROOKE: The idea of passing any law by Congress to govern commission men is folly to consider; as well talk about passing a law governing any farmer, if he happens to do business with parties outside of the state. We have the common laws of the state; let us drop the discussion. I know a man who shipped a car-load of sweet potatoes to Denver, and in place of a remittance he got word to send more money to pay balance of freight charges. With regard to controlling these dishonest commission men, I am really sorry that the commission men of this country are not up to the standard of the London commission men. In London I understand the commission men are men of the very highest character, and their business is based upon the fundamental principles of honor. Let the fruit growers form an association and keep a record of the bad men. Just as an illustration, some grocerman in this town received a call one evening from some man in the town, who wanted to purchase coal, seed or something, I don't know just what. The seller said: "Yes, I have it." Just then he was called across the street. It occurred to him to look his customer up. He did so, and when the man came back he said, "We can't let you have the goods." The prospective purchaser said, "Why not? You said you had it, and said you would let me have it." "Yes, I said I would let you have it, but I have changed my mind. I find that you have a bad mark." Now our friend has found some men who have bad marks. When we find them we had better not deal with them. If you inform other men in the country, that party will soon be out of business, or be conducting business on honest lines.

PRESIDENT HOLSINGER: Often they get out and conduct business under another name.

A. L. BROOKE: You can report that fact.

J. J. ALEXANDER: I think the commission man has some rights, and I

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don't like to see him abused all the time. They get stuff from all over the country. All kinds of stuff. You can go into his place of business if you want to buy, he has the goods to sell and will sell you what you want. If you want to buy No. 1 he will sell it to you and charge you for No. 1 stuff. He is glad to get anything for some of the stock he has for if he doesn't get something out of it quickly it goes to the dump. I have seen absolutely worthless stuff come into commission houses. I have dealt with commission men considerable and usually get about what I buy. If I buy No. 1 goods I get it, and if I want something cheaper I get that; they give me what I am willing to pay for. There are no returns if they don't get anything for your consignment.

PRESIDENT HOLSINGER: My experience is that they always get their pay.

QUERY: *What legislation is needed regarding the control of noxious insects?*

PROFESSOR POPENOE: I take it that there could be very little argument as to the propriety of some legislation for "control of the noxious insects." Kansas is one of the few states of the Union that has paid no attention to the requirements of fruit growers and tree planters—to their protection from the outside. We have considered ourselves secure for the most part. The great pest which is to be noticed, over and above those that we already have in great abundance, is San José scale. It has been found in some counties in the state, one of them very serious and another one giving promise of a greater showing within a few years, and both of these are undoubtedly due to the importation of trees from outside. I say this after having, in one case at least, learned about its origin. I refer to the case of Dodge City. The east side of Dodge City is infested with San José scale. It is difficult to find a tree there that has not some trace of the pest. A good many of the ornamentals are not infested, but most of them are. I don't believe there could be a worse case of infestation than there is in this locality. The second case is in Rice county, and from the owner of the little plantation I learned that he had bought trees of a local nurseryman. The local nurseryman, on my request, gave reference to two Kansas nurseries and one Iowa nursery as the probable cause of this pest. I visited one of these nurseries and made a special inspection of it, with a view of satisfying myself as to whether the scale had come from that origin, because I was interested there. I gave his ground a thorough examination and found no trace of any such insect in connection with any tree whatever. I went to his orchard and found the original Bismarck. The other nursery I did not examine, and can't say whether it is there or not.

I believe that these cases themselves, and others that may probably be found, are not due to carelessness of our Kansas nurserymen. Most of them are very able and capable men, and are just as much alive to keeping this pest out of their ground as any one can be, because they recognize the necessity of it in the preservation of their business. But, unfortunately, having no law to protect ourselves from such pests, we are at the mercy of the Kansas nurserymen. It is up to our nurserymen now whether they will accept trees from other localities that are not inspected. I believe that most of the nurserymen do not do this. As far as my own information goes, most of them pay careful attention to the condition of the trees which they receive as to the presence of insects that are most likely to occur. There are a good many small dealers that are not so careful. I do not wish

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to speak against any man's business, but I know of cases where men care little except that they get the fifty cents or a dollar a tree out of the deal. I believe the time will come when Kansas will be included in the list with most of the other states in having a protective law for our own benefit. I believe the state desires something of the sort.

So far as I have seen the census, there are but five states and two territories that have laws prohibiting the importation of destructive insects. Most of the other states have ample laws of inspection. Some of them are very stringent—some, I believe, entirely too much so, because they make unnecessary trouble for the nurseryman and the dealer. I think that under the plan of inspection, as practiced in most states, the importer under certificate is reasonably sure that his trees have been examined in as careful a way as possible, and that he is warranted in believing that certificates of non-infection are good. The census of the law shows that annual inspections are provided for in most of the states, some states semi-annually, and some states oftener than is required. Inspection laws of thirty-four states require an inspection certificate from proper officials or officers on each separate package. In addition, a fumigation certificate is required in twenty-one of the states; that is to say, that besides the inspection they require also fumigation certificates, certifying that fumigation has been made on this particular package before it has been shipped. Inspection by state officers at various stations is required in several states—California, Kentucky, Nevada, Oregon, Washington and Montana. In one particular instance—the Ohio law—a very proper idea is incorporated, in my opinion, to this effect: that the statement of the dealer should be required, giving the source of the stock, before putting it upon the market, and that all such stock has been properly inspected and fumigated. This, it seems to me, is one of the weak points in the Kansas inspection laws.

In a general way I know that in Kansas while inspection really covers stock anywhere from the 1st of July to November, perhaps, that the inspection covers only the stock grown in the nurseries. I believe it is the practice in our state to require, under the Kansas law, a certificate on stock that they may have shipped from outside sources, taking it for granted that most of them get stock from outside, from which they fill orders which have been received by them, under proper inspection certificate, so that this is not misleading or troublesome; but there are so many cases where the reverse may be true. I find it so among small dealers because they have not sufficient area to give to nursery stock to warrant it; they are very likely to buy where it is cheap, and in some places I know that they are not so careful as they should be.

An inspection law covering the state of Kansas should be passed by our legislature this coming year, making compulsory inspection by proper officer of every nursery in the state as rapidly as can be done. It should cover the inspection of every plantation, large and small, everywhere in the state. I think it is necessary, because I believe that our people who buy for planting are the ones that are most likely to get the San Jose scale in their orchards. Generally our orchardist either grows his own trees or buys them—contracts for them—from some responsible nurseryman, and only buys the best from the large nurseries of the state. All nurseries, particularly those run on a large scale, realize that they must keep their records clear for their customers.

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I believe we are going to find San José scale in all small plantations. We ought to hunt out such nurseries as have it, and it seems to me that there ought to be some way of finding where they are sending their goods and heading off their work. I would say that I believe we should give, in this law, decided encouragement to the shipper, within or without the state, to practice fumigation. It seems to me that it is as good for the nurseryman as for the purchaser. If he can add a certificate of fumigation to every certificate of inspection it seems that it should satisfy any purchaser; and, after all, it is the very safest thing, because however careful the inspection is in the nursery it is impossible for the inspector to examine any large proportion of the stuff as carefully as it is done in the field. A large portion is going to escape his notice; although, if he is careful and knows how, he can see at least part of it, and knowing the source of the scale, he can probably head the thing off.

In shipments from outside the state, after certificates from proper officers, carriers should be instructed to refuse to accept for shipment any stock not so certified. Next would be local provisions for the proper enforcement; and here perhaps the most common idea, at least in that regard, is to avoid expense to the state. I believe that this work should be placed in the hands of the entomologist, with provision for proper assistants, the work to be done, if possible, without expense to the nurserymen.

In a number of states an appropriation is made to provide for sufficient expert assistants of the entomologist and the Experiment Station, in order that the work may be done without expense to them. In some of the states, however, the nurseryman is taxed to pay for the work done. Sometimes there is an inspection tax and other times his license requires it, and in various ways the nurseryman has to pay what, in my opinion, is not more than his fair share of the expense of the inspection.

The laws should be properly drafted by some one who knows how and who does not care so much for the safety of the trees as he does for the death of the insects.

A MEMBER: How, then, can you incorporate it in the inspection law?

MR. POPENOE: I think that the inspection officer should be given some power to enforce the law. There are a good many things to consider about that, but I am not enough of a lawyer to know what to say about it; but there certainly should be some provision to give police power to the inspection officer. There are people in the state who object very much to have me enter upon their premises to see whether the San José scale is there or not; don't care particularly whether it is on their trees or not, and the inhabitants don't like to see me in their yard. If a man has a half dozen or a dozen trees that are covered with San José scale he don't care to have the inspector go on his place, although it may be a public nuisance. Police power can be very properly given the inspector to enable him to enter upon the premises and, if infestation is found, to compel, for the protection of the surrounding country, the removal of the trees.

QUERY: *Is nursery inspection of any value to horticulture?*

T. H. SMALLWOOD: I feel considerably embarrassed to attempt to answer that question, but it seems to me there could not be much doubt as to nursery inspection being a benefit to horticulture; that is, where it is true inspection, the kind I believe we get in Kansas, and I believe that inspection

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will save the horticulturist hard-earned money; it will save his spending it for stock that is worse even than worthless; and it is liable to save him that cost, if it is real inspection. Its effect is to make every man who raises trees careful to keep them perfectly free from every noxious thing that is liable to be found by the inspection, and it would also save the horticulturist time, which is of more value really than money in this altogether too short life of ours. We have n't time enough as it is, and the time we spend trying to raise something only to find that it is infected with some injurious insect, we have lost, finding out that it is diseased and worthless. Then it is that a man appreciates the value of inspection—after he has spent good money and good time and lots of labor in caring for trees that are infected, and he has been deceived. It also saves his confidence. We have n't, any of us, much confidence in our fellow men, and anything that is likely to weaken that confidence is an injury. Of course, the inspection question is an old one, and no doubt there are men here who can reply to the question better than I can.

A. L. BROOKE: I would like to have Mr. Popenoe give us some idea, if he can, as to how nearly the inspection has covered the nurseries in Kansas.

PROF. POPENOE: Mr. Chairman, I don't know quite all about the inspection in Kansas, but I should say at a guess that the important nurseries are all inspected annually; and while I know that occasionally a small nursery is overlooked, it is not the fault of the inspector. You will understand that there is no inspection law in the state of Kansas, and whatever inspection has been done here has been at the invitation of the owner himself. There have been two inspecting officers—Professor Hunter and myself, who have been called upon to do this and have been always invited by the nurserymen themselves. They do it as a matter of business. They are exporters, and as the laws of other states are sometimes quite stringent, requiring a certificate before they can ship [pass the state line], they call upon us for inspection. It is only those who desire the inspection, as a rule, that are inspected.

A. L. BROOKE: I believe it is most important that the orchards, and especially the older orchards of the country, be inspected. I believe every fruit-growing premises in the state should be thoroughly inspected. There is more danger from San José scale from the orchards than from young nursery stock, and there is more danger of its getting a foothold and starting and spreading from there. I would like to make a motion that there be a special committee appointed to take up this matter, in conjunction with the nurserymen of the state, with the coming legislature, so that we may get some wholesome, effective law.

[The motion carried. See committees.]

QUERY: *Would dipping bundles of nursery stock answer as well as fumigation?*

J. J. ALEXANDER: I think dipping preferable to fumigation. Either is good, if thoroughly done, but we could detect if the dipping had not been done. With fumigating, the farmer would not know whether it had been done or not. I would not know what formula to give for dipping. I know that we often get nursery stock, with inspection tags on the bundles, that is infected with everything. I saw stock last spring, sent out marked "in-

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spected," and it had San José scale on it. One of my neighbors got a little bunch of stock with scale all over it, and I went over one day and pulled them up. I didn't know what was the matter, and thought it better to get rid of them. As Professor Popenoe said, I think the larger nurseries would protect their own interests. I feel well satisfied we haven't any one in Kansas that would not do that; our fellows are all honest. It is from out of the state we get it. There is nothing to prevent our people from sending off and getting what they want these days. They will send off for poor stuff because it is cheap. But I believe by rejecting it we would get better acquainted with it and find something better.

PROFESSOR POPENOE: Regarding this statement about sending off, I was the recipient of a price-list from an outside nursery at one time, in which they stated that San José scale had been found in their nursery but at that time they believed it to be free, and that they sold this stock, however, on no guarantee, and offered it for sale, and no doubt they sold it.

PROF. HUNTER: As proof that our danger is greatest from the importation, I will say that in 1898, down near Argentine, our department found one pear tree fairly well covered with San José scale, and the party who imported that tree said it cost him three dollars. It had a name about as long as my arm. It was sold to him, on a mail order, from Pomona, N. J. In a consultation with his two sons one whole afternoon, on the question of the advisability of growing that tree or cutting it down, it was finally decided to destroy it, and it was dug up by the roots and burned right on the spot, to annihilate that one case. We made certain of that case.

PRESIDENT HOLSINGER: Can San José scale live on dead wood? I will answer that myself. I was in Maryland some time ago, and went through the worst infected region there. They determined that it was a fact that San José scale could not live on dead wood, and didn't go to the trouble of burning the trees, but simply cut them down and the scale died, which shows that San José scale cannot live on dead wood. They must live from the sap of the tree.

G. S. CHRISTY (Nebraska): In examining stock in Lincoln, Neb., shipped in from the West, I found some shipments entirely covered with San José scale.

MRS. B. B. SMYTH: I would like to ask Professor Popenoe if he found that San José scale, after once getting in a locality, might not live on the Osage hedges and shrubs, in places where it is not likely to be noticed. I came from a region in Ohio that is badly infected with San José scale, and I heard it stated that if once introduced into a district it soon found a breeding place on the Osage hedge, where it was almost impossible to eradicate it. I know we had a great deal of experience with the pest. A neighbor of ours brought in some fine pears, and already had fine peaches on the place, and within two years the pears and peaches in that new yard were completely infested and the trees dying, and that first called my attention to it. They didn't seem to affect the plums and cherries so much, but they eventually killed the pear and peach trees, or infected them so badly that it was found necessary to destroy them. You will find the Osage hedges a breeding place for the San José scale, and they should be included in the inspection.

PROFESSOR POPENOE: I have seen trees twenty-five feet high encrusted

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from top to bottom; wherever the old bark breaks open they were veritably alive with San José scale between the cracks. It is also on young trees. It is very difficult to handle by any spraying method. I have seen hedges infested with it in a horrible way.

As far as the scale being able to kill all varieties of fruit-trees is concerned, there is not one of them that does not show more or less injurious effects. I have found dead trees of all varieties.

QUERY: *How may purchaser know if nursery stock has been fatally frozen?*

J. F. CECIL: I take it that this query refers to stock that has been damaged, or is supposed to have been damaged, in transit; and I would suggest that the first thing to do is to place the package in a cold cellar, or else bury it. If there is any frost in the bundle or package at all straw should he placed around the roots. The inside lower part would be damaged first. It is quite possible for frost to be in the package without causing injury. I have known small fruits to be frozen some and yet the roots remained uninjured; in fact, these would not be seriously damaged at all. But if the main roots are discolored, the stock may be injured. So that, in order to be sure of the matter, I should say, place your package in a cool cellar, or bury it, and give time for the frost to be drawn out. If there is any injury you can detect it then by the discoloration of the bark.

QUERY: *Is not the representation from local horticultural societies—two delegates—too great?*

B. F. SMITH: I didn't study this program as I should, and only found two or three days ago that I had anything to do with it. I will say that in a little while, if our life membership grows, we will not need any delegates; we have enough life members for voting to hold an election now. And life membership, I should say, is and will be the backbone of the Society. It makes it more interesting. There were times in the past when we had to have delegates in order to hold an election. Possibly some societies who hold only one or two meetings a year send delegates to our biennial election of officers, and we hear nothing more from the delegates. At the next election we have a new set. That is why I think the Society will soon be able to stand by the life members. I don't know that this should apply to societies like the one in Douglas county, in which we are now in the fortieth year, and hardly miss a month but what we hold our meeting. This may be an exception. It should have delegates as long as its organization is kept up; but there are societies, as the secretary well knows, that hold only one or two meetings a year, and I do not think such a society has any right to delegates at all. Then there are other societies that are very small which of course might have possibly one delegate. I think that all delegates should be fruit growers, and I think that life members should be fruit growers. I am glad to see that the societies from the West have members here.

B. B. SMYTH: I hardly agree with Mr. Smith in regard to the representation from societies throughout the state. I think it ought to be dependent largely upon the number of societies in the state, and should not depend upon the size of the room, because, in case this room is filled, as it might be, we can find a place to meet in Representative Hall, the same as the State Board of Agriculture, the Historical Society, and other depart-

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ments do. The representation I should say, from the different societies, might be reduced to one, when found necessary on account of the great number of societies in the state, but it seems to me that representation from societies outside of the state is necessary for the building up of the State Horticultural Society, which should not depend upon life membership entirely. We want delegations from other societies to come. We need the delegates, in order to induce them to become life members afterwards, if for no other reason. I don't think that delegate representation ought to be cut out entirely.

A MEMBER: Mr. Smith said the delegates should be limited to fruit growers. We have a good many members who are not fruit growers. If the Society is limited to fruit growers alone it would cut out a good many of us. While I grow fruit part of the time, most of mine is gardening, and I don't think it should be limited to fruit growers.

EDWIN TAYLOR: That is an important mistake some fellows make. Horticulture does not convey the idea of fruit growing exclusively. Anything that pertains to gardening is pertinent here.

GEO. A. BLAIR: Mr. Taylor has stated the proposition that I arose to make. Now, if I understand it, the mission of this Society is to create an interest in horticulture all over the state, and it is to encourage horticulture in every form and manner. In order to do this we have auxiliary societies formed—children of this mother Society—all over the state. I think it is right and proper that they should have a representation of at least one delegate. I don't believe that two are necessary; but one delegate coming here and having the experience can go back and inform his local society what has transpired here, and in that way we will convey a great deal of our program here to our children societies. It seems to me that the horticultural interests of this state are very poorly appreciated by the state at large, and the more we have here the greater force we can bring to bear in this matter, and I believe we can get the relief we are seeking in the way of legislation. I am in favor of one delegate and not two.

E. P. DIEHL: I don't think we should be limited to life members. Just as Mr. Blair has said, I don't believe we can ever get too large a representative body in this Society—there is no danger of that. We want to encourage all the delegates we can—at least one, and I would say two, from every society.

J. L. WILLIAMS: I am personally interested in this matter. For years I have been doing my very best to get more members in this Society. I am certainly in favor of two members from every society, and I will tell you why. Every time we get delegates from county societies to come up here they will come up once or twice or three times as delegates, possibly, and by that time they have become so thoroughly interested in our Society that we get them about two years for annual members and later as life members; we are dead sure to get them finally. We take them on probation, you might say.

QUERY: *Are the recognized commercial varieties of apples deteriorating?*

PHILIP LUX: It is no longer a question, but a fact apparent to most of our apple growers, that we have practically lost the Winesap and Missouri Pippin as commercial apples. For example, I have forty Winesaps, from

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fifteen to eighteen years old, and with one exception they are worthless. They are shy bearers and the fruit is too small for the market. These trees are growing on ideal orchard ground. I also have about forty Missouri Pippins. Twenty of them, which are eighteen years old, bear only diseased apples, unfit for the market; and twenty, which are fifteen years old, bear fairly sound apples, which are, however, too small for mercantile purposes. Our Ben Davis and some others are following the same road very rapidly.

These conditions are common in our county, and many orchards are in part or entirely worthless. A solution must be found and put in practice at once if we desire to preserve our apple trees in their most useful and valuable condition.

From time to time excellent papers on spores and fungicides have been read before this Society by our State Agricultural College experts. These papers were compiled with thought and practical study and have been a great help to our horticulturists. But while the study of the diseases and the devising of methods for combating them is of great importance, nevertheless, if we do not have trees which produce good apples, and produce them plentifully, the successful dealing with the disease would still leave us with inferior or scanty fruit. Therefore, I would suggest that more emphasis be laid on the right breeding to improve the quality, size and quantity of the fruit produced as well as to put constitution into the trees to resist the fungi. The old adage, "An ounce of prevention is worth a pound of cure," applies in this case.

RESOLUTION ON SPRAYING.

Resolved, That it is the sense of this Society that the legislative committee should use its influence to procure the passage of some law providing for compulsory spraying for the destruction and control of injurious insects and fungous diseases. G. W. COLLINGS.

President Holsinger appointed the following committees:

On Credentials: G. A. Blair, J. J. Alexander and B. F. Smith.
On Elections: F. L. Kenoyer and Albert Dickens.
On New Members: J. L. Williams.
On Exhibits: A. V. Wilson, E. G. Hoover and William Cutter.
On Auditing: J. J. Alexander, E. P. Diehl and William Cutter.
On Obituaries: A. L. Brooke, E. J. Holman and G. W. Collings.

Adjourned to 7:30 P. M.

EVENING SESSION.

The meeting was called to order at 7:30 by the president.

BEE-CULTURE *versus* HORTICULTURE.

By C. P. DADANT, Hamilton, Ill.

These two branches of agricultural economy are allied to each other, for they may be carried on by the same producer and form a profitable combination.

There are, however, persons who think that these two industries are antagonistic. A demonstration of the incorrectness of these views will make the subject of this address.

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There are two points upon which wrongly informed horticulturists think that bee-culture is objectionable. The first is the bees' influence upon the blossoms, the other their depredations upon fruits.

Bees have been said to work injury upon the blossoms of fruit-trees and shrubs by removing the honey and the pollen. A very elementary study of the structure of blossoms will enlighten us on these points.

HOW THE BEES CARRY THE POLLEN.

In most of our fruits, the sexual parts of the bloom are to be found within the one corolla, the male part being the stamens, or pollen-producing organs, the female part being the pistil, or fruit-bearing stem. It is only by the scattering of the pollen in minute quantity upon the pistil, that the blossom may become fertile. Pollen is a dust of different shades, according to the blossoms from which it is produced, which has the power of making the fruit productive, or to cause it to "set," as some people say. This pollen, under the powerful microscope of scientists, proves to be composed of very minute round balls having much the shape and appearance of Osage oranges. These little pellets are gathered by the bees to be used in the larval food of the immature bee. So pollen is not consumed by the adult bee in any quantity. It is carried to the hive upon the third pair of legs, in a cavity which nature seems to have provided for this sole purpose. Bees may be seen laden with it at any time during the spring or summer months when returning to the hive, and many uninformed persons have taken it to be wax pellets. This is incorrect, for beeswax is produced from honey by digestion.

In gathering these pollen grains, the bees shake them from the stamens which have produced them and cause a number of them to fall upon the pistil. So eager are they in the gathering of this pollen dust that they are often covered with it from head to foot, as if they had rolled themselves in it. They commonly use the first and second pairs of legs to brush it off their bodies and pack it into the pollen baskets on the tibia of the third or last pair of legs. Not only does the action of the bees scatter this fecundating dust upon the female part of the plant itself, but it also distributes it from one blossom to another, from one tree to another. In this way in-and-in breeding is avoided. Although in-and-in breeding is very good to intensify certain qualities of plants, it is well known that this, when carried on to excess, finally results in sterility, both in plant and animal life. The action of bees and other insects in bringing about a cross-fertilization is well evidenced in the sporting of peaches, which cannot usually be reproduced exactly by the planting of the stone. A still better evidence of the sporting caused by the action of insects is found in melons, cucumbers, and pumpkins, which, when planted in sufficient proximity of each other, will produce offspring which is neither cucumber nor melon, but a mixture of both.

It has been ascertained that in numerous fruit-blossoms this pollen transportation and scattering on the part of insects, and of the bee in particular, is indispensable to the proper fertilization of the bloom. Observing horticulturists have noticed that their orchards are never so full of fruit as when they have had two or three days of warm weather for the blossoms to be visited by honey-gathering insects. In the case of some blossoms, such as the strawberry, of which some varieties are imperfect and carry only pistils and no stamens, it is absolutely indispensable that some insect be able to

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carry the pollen from the perfect blossoms to the imperfect ones. Strawberry growers well know that some varieties must be accompanied by other varieties in order to become productive, but even if they were planted together there would be but very remote chances of cross-fertilization if it were not for the agency of the winged insect.

So much for the removal of pollen by the bee; but what about its absorption of the honey? Some have said that the honey exuded by the blossoms is reabsorbed by these same blossoms in the support of the young fruit, and that the removal of this honey works an injury to the fruit. I cannot agree to this. Whether the honey is reabsorbed by the plant or not, I have very good evidence that its removal works no injury. The largest crops of honey in our section of the country are gathered from white clover and Spanish needles. In Colorado and the West generally millions of pounds are gathered from the alfalfa. I have yet to learn of a single instance where these plants have failed to produce a bountiful crop of seed after having given a heavy crop of honey.

Whether we believe in a fixed purpose of progress in nature or in the invariable outcome produced by the survival of the fittest, or in both of these theories combined, we must acknowledge that the existence of honey-gathering insects shows a beautiful adaptation to the conditions of plant life.

DEPREDATIONS OF BEES UPON FRUIT.

Let us now look upon the other objection to the culture of bees in connection with horticulture, the depredations of bees upon fruits. I think that if it can be shown that the bees prey only upon damaged fruits, and this only in exceptional circumstances, the verdict will be in their favor, for damaged fruit when hanging upon the trees or the vines is of but little value. If not harvested at once it will rot, so the bees gather only that which would be soon wasted.

But do the bees damage sound fruit? or, better yet, Can they damage ripe fruit which is sound? An examination of the mandibles of the bees in comparison with those of many of the hornets and wasps reveals the fact that while those of the hornets are like saws, the mandibles of the bees are rounding and deprived of teeth. Their jaws act from side to side, instead of up and down as in animals, and they are shaped like spoons. They can grasp objects or the stems of plants. They are made to manipulate soft substances like beeswax. They can make a hole in cloth or in paper, but an examination of the method used will show that they first take hold of a projecting thread and pull it out, and then take another, and keep pulling, till they change an apparently smooth piece of goods into a rag. But when it comes to the smooth skin of a fruit, all they do is to remove the soft down or bloom of the fruit, if they travel upon it long enough, but they are no more able to bite into it than a human being could bite into a smooth plaster wall. This may be demonstrated by actual test. The most expeditious method is to place a bunch of ripe grapes inside of a populous hive of bees, previously puncturing a few of the berries and taking note of it. After twenty-four hours or more investigation will show that the bees have sucked the juice out of the punctured grapes but have left the others intact. They will even go as far as to cover these with propolis or bee glue, as they do with every foreign substance of which they cannot get rid. Some persons assert that they are sure the bees injure fruit, because they have seen

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them at work upon it, and because large quantities of fruit, especially grapes, have been found entirely destroyed where bees alone were found upon them. This is simply a delusion similar to that of the uninformed human being who denies that the earth turns around the sun, because he sees the sun rise and set and does not feel the earth turn under his feet, and argues also that it would be impossible for him to live and hang on when the earth was bottom side up. The bee evidently works upon the damaged fruit, and feels so innocent about it that it does not even fly away when we catch it in the act. Let us get up with the dawn, before sunrise, and go to the vineyard or to the peach orchard, and there we will catch the real culprits who damage sound fruit—quails, robbins, catbirds, etc. They gather there by the hundreds, they eat their fill, and when no longer hungry they find a pleasure in wantonly plunging their beaks in the soft fruit. In many instances you will find a bunch of grapes with hardly a sound berry, and they are all plucked on the same side, many of the berries showing two holes, one above the other, a short distance apart. It was done by the two points of the bird's beak.

But the sun rises above the horizon and the bees come to gather the fragments, and so does man, and he straightway puts the blame on the little industrious toiler, who works from daylight till dark for its board and never fails to bring its harvest to the hive, to be later robbed by this complaining human miser.

Bees do not work at all times, even on unsound fruit. Is it because they are lazy at times? No! it is because they find something better. Whenever you find the bees in damaged peaches or grapes, you may be sure that there is no honey to be found in the blossoms. There are seasons of honey scarcity, when they manage to gather quite a little partly fermented fruit juice. It is the best they can find, but it is not very good for them, for it will turn sour in the hive and will make bad winter food. The prudent apiarist removes all this unhealthy food from the hive before winter and gives them good honey instead. There is never any great quantity of fruit juice harvested, because in many cases the bees are made drunk by its fermentation and fail to reach the hive alive. So when bees are seen to feed numerously upon damaged fruit, it may be safely asserted that the apiary is more injured than benefited thereby.

THE HORTICULTURIST AND THE BEE.

I have shown that the damage caused by the bees is more imaginary than real. Let me now look upon the damage which has been occasionally inflicted to the bee by the horticulturist. It is done by injudicious spraying of fruit during the bloom. Dealers in spraying instruments have formerly asserted that it was necessary to spray the fruit-trees while they were in blossom. The result has been a wholesale poisoning of honey-gathering insects wherever this method was pursued; the poison in the spray mixed with the honey in the corolla and endangered not only the life of the insect that sipped any part of this liquid, but also the lives of those who might eat of this honey in the combs. So the spraying of fruit-trees in bloom may very easily be made a criminal matter. But is there any advantage in spraying fruit-trees in bloom? What we seek to prevent is the puncture of the fruit by the depredatory insects, such as the codling-moth, the curculio, etc. These insects puncture the fruit only when it is formed, and their de-

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struction must follow the formation of the fruit. The throwing of any poisonous mixture upon a blossom can have but one effect—that of destroying the efficiency of the pollen, if it becomes diluted in this poison.

The assertions which I have made in this paper are based upon positive facts. I have been a bee-keeper on a large scale for some forty years, and have grown peaches, apples and grapes also on a large scale. I have some twelve acres of vineyard in full bearing, and during the past summer also harvested, in partnership with my son-in-law, some 1200 bushels of fine peaches. I have often taken visitors into the vineyard and shown them without possibility of error that bee-keeping and fruit growing are not antagonistic, but are profitable when carried on hand in hand in a suitable location.

ABOUT CIVIC IMPROVEMENT.

By Christian Jensen, Topeka.

By civic improvement we understand improvement which concerns the public, either of a nation, a state, or a community.

In this paper I shall take up the subject under two headings: I.—Mechanical Improvements (dealing with dead mineral material); II.—Beautification Improvements (dealing with live vegetative material); and give examples of work, methods employed to carry it out, with suggestions for further developing improvements and beautification of various kinds.

I.—Mechanical Improvements.

National.—The National Civic League, in its efforts to preserve Niagara Falls, should have the support of the whole people, and it is to be hoped that the United States and Canada will take action to prevent its destruction.

Bill-boards should be taxed out of existence, is the opinion of the league, and a fine thing it would be, as they serve only as hiding places for filth and crime, and in the country are unsightly features which mar the beauty of the landscape.

State.—The Kansas legislature should be asked to fix a tax on bill-boards and signs advertising goods for sale, and the painting of signs on fences and bridges, or a law should prohibit this great public nuisance.

The enactment of a law causing the removal of all "goods for sale" signs, and preventing them in the future, would mean no outlay nor financial loss to any one; on the contrary, our home merchants should profit by it, inasmuch as all foreign competition would be removed. I need not describe any of the signs, but that many of them are very objectionable is a well-known fact, and every man and woman with civic pride would gladly recommend their removal.

All outdoor advertising should be confined to the place of business, and our newspapers should have the balance, as they are the only proper medium for this purpose. The law should also prohibit political campaign posters to be placed on any object for advertising prospective candidates.

Signs which would benefit the public should be placed on all bridges, showing the name of the stream which it crosses, and signs at all crossroads should tell distance to the nearest town, with name and direction. (I thank Secretary Barnes for this noble suggestion.)

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Macadamized roads are worth more than railroads, therefore let us push their construction and see to it that when built they are properly cared for.

CITY IMPROVEMENTS.—A clean city is an attractive city, and cleanliness is the most important factor in all civic improvement work. The filth on the streets and sidewalks is composed of a great variety of materials, which are ground and mixed under the influence of traffic and then transported by the wind into every crevice and place of shelter, where it too often is allowed to accumulate in large quantities.

How can a city be kept clean? It can be done only by the proper application of preventive as well as remedial measures.

PREVENTIVE MEASURES.

Macadamizing of roads leading into the city, which will greatly reduce the transportation of mineral soil to the paved streets.

The hitching of horses on business streets should be forbidden, as this practice results in the transformation of a street into a barn-yard, as you have seen it on the finest street in America (Kansas avenue). Temporary shelter could be provided on vacant grounds near the business streets, where horses could be cared for during one or two hours' shopping.

REMEDIAL MEASURES.

Street Cleaning.—The methods employed in cleaning our streets are of a primitive character and could be greatly improved upon without increasing the cost. First, all streets, or at least all business streets, should be cleaned during the night, when it can be done with the least discomfort to the public, between ten P. M. and six A. M., whenever climatic conditions permit, and business streets should be cleaned every night. Second, washing with water should take the place of sweeping on all business streets, as this would keep the dust off the streets and make sprinkling unnecessary. For example, two men armed with hose should be able to wash Kansas avenue from Tenth street to the Kaw river in eight hours, beginning at the highest point; one man making the connections and helping with the hose, which should be not more than two inches, the other man at the nozzle, forcing the debris before him by constant horizontal movement of the nozzle the width of the street, which would permit of washing only one side at a time.

The advantages of washing business streets during the night are, reduction in cost of labor, no dirt to accumulate, no sprinkling necessary to keep down dust—clean streets. Water used would serve to keep sewers in sanitary condition; no interference nor discomfort to traffic; street cleaning made pleasant.

The only disadvantage is the amount of water used, but this would be of minor consideration when the advantages are summed up and compared.

Alley Cleaning.—This should be done by the city at least once a month; and in this connection it may be advisable to tax horses and cows to meet the necessary expense for this work.

WATER SERVICE—GAS SERVICE—WIRE SERVICE.

All water-mains, gas-mains and electric wires should be carried in the alleys, and in the business district a tunnel should be built sufficiently large to accommodate the mains and make repairs easy. The tunnel should also carry all electric wires, thus doing away with poles, and preventing destruction of fine streets caused by repairing water- and gas-pipes.

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The Gas Service.—All gas-pipe mains shall be carried in the alleys. The advisability of making this provision when granting a franchise to a gas company is apparent to any municipal government. The destruction and disfiguration of fine streets, sidewalks, parkings and front yards, as shown all over the city of Topeka, suggest that something be done to prevent it; and the alley is the only solution of this problem. The advantages of having the gas-mains in the alleys will easily outweigh any disadvantages which may arise in this connection.

The advantages are: No destruction or disfiguration to streets, parkings, sidewalks, and front yards; cost of laying the mains and connections to buildings or actual point of consumption reduced to a minimum, because the actual point of consumption in most cases is closer to the alley than to the street, and the obstructions met with under the present system would be eliminated.

Electric-wire Service.—The telephone companies are beginning to realize the importance of having their wires underground in the business section, and in the residence section they are placing their poles in the alleys. One company has painted its poles green, to make them last longer. This is all work in the right direction and should be pushed.

By placing the electric-wire poles in the alleys there will be no further need of disfiguring our street and avenue trees.

UNDESIRABLE FEATURES OF STREETS AND PARKINGS.

One of the most conspicuous exhibits is seen in front of blacksmith and carriage-repair shops, which are utilizing the streets and parkings for storage of all sorts of vehicles and farm implements, thus hindering traffic, destroying trees and grass on the parkings, and in general making the appearance of the vicinity untidy, and also causing a depreciation in property values. A good remedy for this evil would be for the shopowner to use his back yard as storage room.

Grocery stores are maintaining a public nuisance by keeping chicken-coops and oil-tanks on the parking in front of their stores. For sanitary reasons alone this practice should be prohibited, and there is no reason why the back yard is not good enough for the display of this ware.

Junk-shops should be forbidden to exhibit their goods on parkings.

Smoke-consumers are also a remedy, and every city government should provide an ordinance compelling their installation in all factories, shops and other places where large fires are maintained.

RAILWAY ENGINE WHISTLES.

People who live near the railways in our cities are greatly disturbed by the unearthly whistling of locomotives, both by day and by night, when entering and leaving a city; and where an ordinance does not exist to prevent this manner of peace disturbance one should be constructed at once. Whistling may be called for as the speed of trains within the city limits should be such as to make this practice unnecessary.

This concludes what I have to say about improvements of a mechanical nature, which has been but a brief outline of the more important subjects, upon which volumes could be written.

In the following chapter I shall take up, as briefly as possible, improvements as they are looked upon from the esthetic standpoint, or beautification proper, associating ourselves with trees, shrubs, and other plants.

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II.—Beautification Improvements.

National Beautification.—The greatest piece of beautification work to-day is incidentally carried on by the forest service of the United States, which is assuming control of great areas of forested and unforested land. The forest service is preserving the forest upon this land, and replacing forests on denuded mountain slopes and places where forests once existed, and planting forests on the prairies where forests never existed; and by doing this our national government is beautifying the whole country; and it is done incidentally, because the main objects of our forest reserves are timber, water-supply and grazing, for use by the people.

National parks are being established in portions of our country where nature has been lavish in beautifying the earth. The proposed Appalachian Park, when established, will give to America the finest forest park in the world, as nowhere is the vegetation so rich in variety and color, the mountains, waterfalls and streams so beautiful, as is found in the southern Appalachian mountain region.

State Beautification.—Several states are doing precisely what our federal government is doing, by preserving woodlands and creating forest parks for pleasure and use of the people. The New England states and Pennsylvania, Michigan, Wisconsin and Minnesota are foremost in this movement. Our great neighbor state, Missouri, has facilities in the Ozarks for the making of a state park and game-preserve which has no equal, and I hope to see a large body of this beautiful country preserved either by the federal or the state government.

The state of Kansas has an opportunity now which never before has been presented to her. Kansas has an opportunity to create a state park in connection with the exposition to be held in Topeka in 1911, to remain as a permanent monument of this great celebration.

Kansas should make this park of the greatest possible value and utility to her people by making it an educational institution—creating a state arboretum and botanical garden, to exhibit the woody species which have a natural growth in the temperate zone of North America; trees and shrubs, coniferous and broad-leaf species—from the nut-pines of Mexico to the sequoia of California and the grand firs of Washington and British Columbia, and from the spruce of the Maine woods to the long-leaf pine of Florida. It should include the important wood species of the Old World and our native herbaceous plants, flowers, and grasses. Each species would be labeled with name and number, and be represented by as many specimens as space would allow planted in close and open groups in the original way.

In connection with the arboretum there should be a herbarium and botanical library. The purpose of a state arboretum would be to build a park so unique and useful and so beautiful that it would attract people from all parts of the country; to furnish an educational institution for facilitating and advancing the study of subjects relative to plant and nature study; to stimulate interest in the beautiful things of nature which we meet every day, by planting in the minds of the youth the sprout of civic pride, which is the foundation for all civic beautification and improvement.

Every man and woman should know our common native trees, shrubs, and flowers; for only by knowing the economic and the esthetic value of a plant shall we know how to utilize it to serve us in the best manner; there-

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fore, if ornamental grounds are to remain as a monument of the semicentennial exposition, why not make it the most beautiful in America, creating at the same time a splendid educational institution which, as sure as the sun shines, the rain falls, and the wind blows, will grow in value year by year with the growing interest of the people as they learn more of the great need of this branch of education.

The only arboretum of any importance in the United States is the Arnold arboretum of Harvard University, under the direction of Charles Sprague Sargent, who is author of Manual of Trees of North America, The Sylva of North America, Flora of Japan, and other valuable publications. The Biltmore arboretum, of the Biltmore estate, has not yet been finished.

CITY BEAUTIFICATION.—The trend of modern landscaping is to be original—to consult nature, and to make only such features as nature could have created under similar conditions. Formality is permissible only in connection with buildings, streets, or courts, or when the surroundings are all formal in character.

The tendency is also to make each park, where a city has several, serve a distinct purpose, and accordingly an ideal park system would have a lake park, where the prevailing feature should be a large body of water, to be located on low, level ground in the same manner as nature builds lakes in this region, where it will appear natural, where sufficient water surface can be secured at a minimum cost, and where all water sports can be indulged in; a forest park, where true forest conditions would be the prevailing feature, containing chiefly native trees and shrubs in dense and open woods, intermixed with native grasses and flowers, exactly as nature would have it; a zoölogical park, where animals would be the main feature; an athletic park would have sports for its main feature; an amusement park would have amusements; a deer park would have deer. The small parks (corners and squares) located in the heart of the city should be the grounds to receive intensive management. These are the places for formal gardening and elaborate floral designs, because they are seen by the greatest number of people and because formality surrounds them (the buildings, the paved streets and sidewalks, and the parkings, with their straight rows of trees); therefore, an attempt at originality is here absurd and out of place.

The object of a system of parks constructed in the above manner should be economy, effect, and utility.

The parkings, which in the past have been controlled by the adjoining property holders, are at present presenting such a variety of conditions as when summed up proves to be very unsatisfactory; hence the advisability that the city government control the parkings, provide necessary funds, by taxation or otherwise, and adopt a practical system of management, which is just as essential for the parkways along streets, avenues and boulevards as it is for the parks of any city.

Trees being the chief component in the make-up of an ideal parking, it might be well to bring out the points which show the adaptability of a species for this particular purpose. The factors influencing adaptability are (1) longevity; (2) resistance to storms, insects, fungi, smoke and noxious gases where they appear and disappear; (3) shape of crown; (4) foliage—its density, color and shape; (5) kind of seed; (6) flowers and winter buds; (7) rate of growth; (8) root system; (9) quality of wood and thick-

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ness of sapwood; (10) kind of bark and thickness; (11) demand upon light, moisture, heat and soil. The distance between trees should be such as to never allow the crowns to meet, thus allowing each tree to develop a symmetrical crown. The distance should vary with the species and local conditions.

Vacant lands show the greatest neglect of any city property, therefore it would be advisable for the city to assume control of all vacant lots and lands not properly cared for by their owners, in order to keep such lands in sanitary and sightly condition. The best way to improve such grounds is to plant them in alfalfa, which is not far behind a blue-grass lawn in beauty, and, by way of economy, is far superior to it. It would cost no more to cut a crop of alfalfa than a crop of weeds.

Fences and old masonry buildings could be greatly improved in beauty by a covering of hardy vines, using honeysuckle and Virginia creeper.

The honeysuckle, with its vigorous growth, evergreen foliage and delicious flowers, together with its hardiness, makes the most desirable of vines for fences and places where support is provided; and for masonry walls no vine is better adapted to this region than our native *Ampelopsis*.

The indigenous vines of Kansas should be protected, because they are the most beautiful vines that grow in America. The grape, the bittersweet, the hop, the Virginia creeper, the greenbrier and the moonseed are the most important.

Hanging Gardens.—In the dense business streets, where no trees or grass can grow, the buildings could be adorned with hanging gardens—not the kind for which old Rome is famous, but architectural projections on the buildings, which should be made permanent and ornamental fixtures, to project out from the main wall at the top of the first story or at the base of the windows on the second story. These projections would be of various designs and dimensions, to correspond with the architectural features of a building, and would contain a basin for soil or plants in pots, tubs or boxes, with perforated bottom connected with a drain-pipe. The hanging gardens can be made beautiful at all seasons by utilizing tender plants during summer and hardy evergreen plants during winter.

BEAUTIFYING COUNTRY HOMES.

A. REINISCH, Superintendent of Parks, Topeka.

There was a time when parks and pleasure-grounds were a luxury that only a few could enjoy.

Wealthy landowners, with refined tastes and sensitive to the beautiful in nature, surrounded their homes with beautifully laid out grounds. A stately building towered out of the foliage of magnificient trees and shrubs, between which were provided open spaces for formal gardens with a profusion of rare flowering and foliage-plants.

From the veranda, or pergola, the eye could roam over a clean stretch of rich green turf, bordered with a bank of shrubby growth and trees, with a variety of forms in body and sky line.

Some who possessed still more wealth could add fountains, lakes, bridges, pavilions, grottoes, etc., to their still larger grounds. But all these grounds were exclusive, to be enjoyed only by their occupants and invited guests; the "people" could admire them from a distance only.

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By a process of evolution the park has come down to the cities and towns. The park idea has become so general that everybody has an appreciation of and a desire for beautiful natural surroundings.

Civic improvement societies can be found in nearly every city and town and in many farming communities. We have developed a higher standard of civic pride and with it a higher standard of home adornment and surroundings. In fact, we have become so accustomed to improved grounds, public and private, that we look for them, and when we come upon a beautiful building with unimproved, neglected, or ill-fitting surroundings, we are unfavorably impressed by the discord.

The growing interest in ornamental trees and shrubs has gradually increased the demand, which is balanced up by an ever-increasing supply, both in quantity and quality; and as to variety, there are new plants introduced nearly every year, and we can arrange to have some shrubs in bloom from the earliest spring days until freezing weather in the late autumn.

The first step in beautifying the grounds of a country home is to decide upon a plan, so that one may know all the details of the work before it is begun. This plan generally consists of three parts: First, the general plan, showing all existing and proposed improvements and their relative position on the ground; second, a working plan, giving measurements for locating drives, walks and other proposed features that may appear on the general plan; third, a planting plan, showing the location of all trees, shrubs and other plants to be used; all drawn to a scale, so that they may be easily transferred onto the ground.

The house should be so located that the larger portion of the grounds can be seen from the windows of the principal rooms. The dining- and living-rooms should receive the most careful consideration, and contrasts in forms and colors created, to give landscape enjoyment in the dreary days of winter. Among the plants for this purpose are the evergreens, trees and shrubs with arching or drooping branches, and those with colored bark, like the white birch, *Kerria*, red-twigged dogwood, etc.

The lawn should be kept free and open, except for a few specimen plants as a bridge from the smooth and even turf to the dense masses of groups and borders.

The drives and walks should rather lead around than through the lawn, as they would lessen its apparent extent and would tend to destroy its restful effect.

THREE FUNDAMENTAL PRINCIPLES.

In laying out a place, especially its drives and walks, we should be governed by the three fundamental principles—design, fitness and utility. Near buildings a formal effect will harmonize with the severe lines of the architecture and the walks and drives can be constructed on straight lines; but away from the house they should rather follow easy curves, but not serpentine. A long drawn letter S is a good form, reversing from right to left, or from left to right, as the case may be. The curvature can be very slight on the plan, yet it will appear quite strong executed on the ground. The most common mistake made here is too much design and not enough utility. The nearer these curves approach a straight line the more utility they possess, while if a walk between two points is made much longer by a curve than a straight line would be, it loses utility and we dislike to follow it. On very extensive grounds a straight line in the shape of an avenue is

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quite proper and possesses the beauty of linear perspective, which is impossible to obtain from curves. Fitness also adds to the beauty of our arrangement of the grounds. If we build a rockery, however careful and of the most suitable material design, on the level ground, it will be nothing more than a pile of stones; but if we use a slope, or dig a break in some inclining ground, we have at once a natural place for the employment of rocks. Here the rockery seems to fill a vacancy and adds variety and completeness to the general scheme.

Having located our drives and walks, the next step is to grade the land, that is, to give it the proper or desired surface. Generally very little grading is necessary, and if we find uneven places, they can often be utilized and become a part of the design, except in the lawn, where it is desirable to have an even and unbroken surface, though this surface need not be a uniform grade.

The more thoroughly we prepare the ground for planting, the better results we may expect and be saved future disappointments. To insure a perfect lawn, we should use only one variety of grass, and if for some reason a mixture is used it should be made up of varieties of similar habit to insure an equal growth. If done in the fall, a very light sowing of rye should precede the grass sowing. The rye is harrowed in and then the grass sown and well rolled. As the rye comes up soon and grows quickly we have a green surface all fall and winter besides the protection to the tender and slow-growing grass. If the ground is poor and has not been enriched before planting, a fertilizer may be used as a top-dressing later on. Bone-meal and fresh wood-ashes, 100 pounds to 1000 square feet, are quite beneficial. If stable-manure is used, it should be well rotted and free from weed seeds.

Next we locate the groups and borders of shrubs and trees, which should be so selected as to give a succession of flowers through the entire season, and so grouped as to give certain desired effects. The sky line is of great importance and must be broken and varied as well as the front line. Care must be taken not to obstruct any pleasant and desirable view from the house or other important points, but on the other hand, to carefully screen unpleasant views. The evergreens in masses are best used for backgrounds, as their effect is too heavy for the middle or foregrqund, except as specimens.

The ground being a supplement to our roofed dwelling, and as we spend a good deal of our time outside, it will be desirable to introduce some conveniences, such as shade, shelter, seats, etc., and also some ornamental features—fountain, sun-dial, arbor, etc. The shade is mostly supplied by trees, but a summer-house affords both shade and shelter from rain and gives us a peculiar feeling of seclusion and rest which cannot be experienced in the open. A table and some seats will transform it into a dining-room or parlor. It is a good plan to connect it with the veranda of the house by a vine-covered pergola and so have a shady walk between the two.

A lake or some other water effect is very desirable and should be considered. It enables us to use a class of plants which are as rare as they are beautiful and easy of culture—the water-lilies. A fountain can be so located that the overflow will feed the lake, the same water maintaining the two.

Another feature of interest and decorative value is the sun-dial, pointing only to the bright and sunny hours of the day. This can be constructed of

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stone or metal, or laid out on the ground, the lines and figures made with plants or inorganic material.

In addition to the planting material mentioned—trees, shrubs, and sub-shrubs—there are many species of hardy herbaceous perennials of great decorative value, which should be considered when making up our planting list.

PRESIDENT HOLSINGER: Are there any suggestions in relation to the paper just read?

A. T. DANIELS: Mr. President, I wish to say that Mr. Reinisch is a citizen we are proud of in Topeka. He has done quite remarkable work in laying out our parks and improving the grounds here in Topeka, and we wish that as many as possible may see his work. Central Park has had only three years' growth, and has made a remarkable growth. It contains a very fine selection of plants and shrubs. In Gage Park, which, unfortunately, is some distance out, there is quite a remarkable collection of plants and shrubs of all sorts. We would like to have you visit these parks and see Mr. Reinisch's work.

EDWIN SNYDER: I want to say that is a very practical paper to which we have just listened. The paper does not bristle with talk the terms of which we common people do not understand. It is very practical, and I wish to commend it.

MR. COWGILL: Central Park is not very far off, and is more easily seen than the one that is more fully developed. It is accessible by the street-car. Any one who will take the "Quinton Heights" car on the avenue will ride right past Central Park. It is only a street-car trip. The street-car runs the full length of it, and practically around it, giving a fine opportunity to see it from the car. It is a good sample of landscape design and is very pretty.

SOME DESIRABLE TREES, NATIVE AND TRANSPLANTED.

By A. T. DANIELS, Topeka.

There are in the United States, growing spontaneously in our forests, more than 500 species of trees that grow to a height of twenty-five feet or more, and in the forests of the state of Kansas are found about seventy species.

It is a fact somewhat surprising that few states have a greater number of trees than Kansas. Oregon, Washington, and perhaps some other states, with a much greater forest area than Kansas, have fewer kinds of trees, whole forests being taken up with two or three species.

There are some very desirable trees, however, native to other states or countries, that are not found in our forests, but that may be successfully grown here, and that are desirable for a variety of form, or foliage, or other characteristics.

I take it that it is a part of the work of this Society to encourage the introduction and culture of every tree that may possibly be grown here, as well as to recommend a new fruit, vegetable, or flower, and that the discussions and papers which are given here each year are such as may help each other and our neighbors to a better acquaintance with everything that grows out of the ground.

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The members of this Society are probably all familiar with the appearance and characteristics of our native trees, and can recognize them at sight anywhere in the woods or on the street; but there are many people who have not had the opportunity to become so well acquainted with the trees and who could hardly tell a cottonwood from a box-elder.

That there are trees not indigenous to this locality that are desirable is already shown by the planting of large numbers of certain species, as the Osage orange for hedges and posts, the catalpa (*speciosa*) for posts, shade and timber belts, the Russian mulberry for windbreaks, and some others for ornament; but there are others not so well known that deserve a better acquaintance.

I have found that there are now growing in Shawnee county more than thirty species of trees, besides the evergreens, that are not native to this locality.

Some of these are the Hard maple, the Red maple, the pecan, the persimmon, the sassafras, the Red or River birch, the White birch and some of its varieties, the Sweet gum (*liquidambar*), the Bald or deciduous cypress, the whitewood or tulip tree, the cucumber tree, the yellow-wood, the chestnut, the butternut, the mountain ash, the Russian olive, the Water-ash, the gingko or maidenhair-tree, the sapindus or soapberry tree, the White mulberry, the Japan sophora, the Bolleana poplar, the Lombardy poplar, the Silver-leaf poplar, besides the Osage orange, catalpa of two or three species, the Russian mulberry, and the ailanthus.

One of the best-known trees, not native to this county but found in some counties of the state, is the Hard or Sugar maple, a tree so well known that it hardly needs description. For dense shade and solid mass of beautiful foliage, no tree can surpass it. It is a conspicuous tree of eastern forests or village streets and is closely associated with our eastern and northern civilization. It does not deserve, however, its reputation as a slow grower, for in good soil, with proper care and attention, it soon reaches a good size.

The Soft or Red maple is a more rapid grower, with not so dense a head. It takes on the most beautiful colors in autumn.

The pecan and persimmon have both been grown in this county and are both desirable for variety.

The sassafras is found, I believe, in only one county in this state, but when once established here is perfectly at home. This tree has clean, handsome foliage, which is seldom disturbed by insects, and which takes on a vivid red in the autumn, unequaled by any other tree. I have found that the young sprouts cannot be transplanted successfully, and believe that the sprouts should be left to get a good size before attempting removal.

The whitewood, or tulip tree, is quite easily grown, and makes a rapid growth in rich soil that is not too dry. The leaves are of peculiar and attractive shape, and it produces its tulip-like blossoms five or six years from the nursery row. It is perfectly hardy, but the wood is rather brittle and it should have some protection from high winds.

The *Magnolia acuminata*, or cucumber tree, has been grown in Topeka, but I do not know of a living specimen at the present time. I have planted several specimens of this tree without success, and believe that it will require especial care.

Several other species of magnolia are successfully grown in Central Park, in Topeka, and have endured three winters and summers, have blossomed

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each spring, and I am quite certain that they will flourish, but as a rule magnolias are difficult to transplant successfully.

The *Virgilia*, or yellow-wood, is a handsome, medium-size tree, a native of Kentucky and Tennessee, and grows rapidly and seems to be perfectly at home here.

The *Koelreuteria*, or varnish-tree, is a native of Japan, and with its compound-lobed leaves and clusters of yellow blossoms, followed by its seed pods in conspicuous clusters, is a very pretty ornament and is very easily grown.

The *Sophora*, or pagoda tree, another native of Japan, is an attractive medium-size tree with compound leaves, perfectly hardy and easily grown.

The ginkgo, or maidenhair-tree, has been quite extensively grown in the East, especially in Washington, for shade-trees. It seems perfectly adapted to this climate and soil, and is a very interesting tree for its peculiar leaves, which somewhat resemble the leaves of a maidenhair fern.

The *Ptelea*, or Water-ash, is a desirable small tree, a native of farther east, and with its bunches of water-like seeds and trifoliate leaves in the summer, is quite interesting and attractive.

The Russian olive, with its pretty silvery foliage, is grown very successfully, especially in the Arkansas valley.

The Bolleana poplar is a rapid-growing, upright tree with beautiful foliage, silvery on the under side of the leaves.

The ailanthus, or tree of heaven, is a native of China and has been planted quite frequently here, as it grows anywhere and sprouts readily, which habit, with the disagreeable odor of the staminate blossoms, makes this tree quite objectionable. Where the pistillate trees can be procured, the objection of the odor is obviated.

The Red or River birch is found in a few counties in this state, and while usually found near streams can be grown on dry ground. It is not so handsome a tree as the White birch, but is good to have in a collection.

The Bald or deciduous cypress, a native of southern swamps, is perfectly hardy in eastern Kansas, and while it prefers a moist location grows very well on dry ground. It is a deciduous conifer, and with its light-green feathery foliage and its symmetrical, pyramidal shape is a distinct and highly ornamental tree.

The American larch, or tamarack, of our eastern and northern swamps can be grown here, but the European larch is a larger and handsomer tree and more easily grown, even in dry ground.

The Sweet gum (*Liquidambar*), also a native of the Southern states, is usually found near streams and in damp situations, but under culture grows very well on dry ground and in rich soil. With good cultivation it soon attains a size well suited for street shade. This tree has a symmetrical, upright shape and attractive leaves, which take on brilliant colors in autumn.

The Sweet chestnut is a beautiful tree and not difficult to grow. Several specimens near Topeka have borne nuts for several years. In one cherry orchard chestnut trees are being planted as the cherry trees die out. They seem to grow as easily in the Kansas river bottom-land as in their native Alleghany hills.

At Manhattan, on the college grounds, are some fine specimens of Blue beech and Water-beech. These trees are not large, but show a luxuriant growth and are distinct and very ornamental.

It is quite rare to see an oak transplanted or growing outside of an orig-

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inal forest, and while we have the following nine species in Kansas, few of them are transplanted, or are ever seen on a lawn or on a street:

These species include the White oak, the Post oak, the Burr oak, the Chestnut oak, the Red oak, the Black oak, the Black Jack oak, the Pin oak, and the Laurel or Shingle oak.

For beautiful oaks we do not need to go outside of the above list, as the Chestnut oak, Red oak, Pin oak, and the Laurel oak are as handsome trees as one can desire, and furnish a variety of form and foliage, with the sturdy character common to the oaks.

Besides the trees mentioned, there are a great number of nurseryman's varieties of different species, many of them having desirable and distinct features.

Some of the leading firms of growers of ornamental trees catalogue nearly 400 varieties of ornamental trees, each having some peculiar or distinct characteristic of form or foliage.

Of these different varieties we may mention Wier's Cut-leaf Weeping maple; with drooping branches and finely divided leaves it is a most graceful and handsome tree and is a rapid and easy grower.

Schwerdler's maple is one of the handsomest trees grown, with foliage bright red in the spring and bronze or russet hue during the whole season through.

There are also some desirable varieties of the linn or basswood, with pretty silver leaves.

Of the trees that cannot be grown at all here, or only with the greatest care, we may mention the beech, with its several varieties, the magnolias, the Sour gum or tupelo, the American and English holly, and the paulownia, or Purple catalpa. This beautiful tree may be grown in the southern part of the state, and one has been grown at Manhattan, but the branches are killed down to the ground almost every winter.

Of evergreen trees, the number of species that may be grown with ordinary care is somewhat limited.

None of them, except the Red cedar, is found growing wild in this state, although in eastern Kansas the Norway spruce, the White, the Scotch, and the Austrian pines, the arbor-vitæ of two or three varieties, and the White spruce are sometimes grown with fair success.

It is greatly to be hoped that further effort will result in producing varieties or methods of growing that will enable us to grow evergreens as easily and luxuriantly as those seen growing in some of the Eastern states.

I think that the members of this Society who have room to plant trees for experimental purposes should be urged to do so, so that as soon as possible we may find out what trees can be grown in each locality.

It would also add largely to the attractiveness of the school grounds to have as large a variety of trees as possible planted where the children could become acquainted with varieties besides those which grow in our own forests.

I would like to suggest that those who have been successful in growing any rare tree or shrub or plant report their experiences and the methods by which they have attained success to the secretary of this Society, and that the members of this Society do carry on as much experimental work as possible in testing trees suitable to their localities.

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A. V. WILSON: What is the age of the pecan trees grown in Shawnee county?

E. J. WHITAKER: The oldest one I know of is more than twenty-five years old, but I haven't seen it for a number of years.

MR. WILSON: Is it a seedling?

MR. WHITAKER: I think so.

E. B. COWGILL: I think Mr. Snyder has had more experience with pecans than all the rest. I would like to have him tell his experience with pecans.

EDWIN SNYDER: I do not know, Mr. President—perhaps I think I have a good deal of information on this subject. I do not claim to be so very well posted upon it, but still I have some interesting information in the matter. Talking about Christian science, I once heard a story of a boy who had been eating green apples, and the doctor came in and asked him what was the matter? The boy said he had been eating some green apples and had awful pains in his stomach. The Christian Scientist says: "There is nothing the matter with you, it is just imaginary; you haven't any pain." The boy said: "You may think so, but I know better; I have some *inside* information." That is the way with me, I have some inside information about growing pecans. I planted some pecans about fifteen years ago, and just a few of them fruited this season for the first time. But then I enjoy knowing that I have them and seeing them grow, perhaps just as much as if they were giving fruit. I am told that this is about the northern limit of the successful culture of pecans, but mine have seen the droughts of the last fourteen summers and the severe winters we have had during that time, and they are in a very thrifty condition. Not all are seedlings. I do not think that any of the fine budded stock grown in Louisiana will grow here. I sent to Texas for the best seeds I could get and planted them in the spring in rows thirty-two feet apart, being somewhat suspicious that they were planted too close together. I have not had the heart to take them out. The first season the rabbits ate every one of them to the ground before I knew it, but it did not seem to make any difference; in fact, all but a very few started to grow. I have hopes that perhaps 50 or 100 years from now I will have the pleasure of gathering pecans from this grove.

J. J. ALEXANDER: I would like to ask what kind of ground they are on?

MR. SNYDER: High ground, pretty well drained—not prairie ground, not black soil. They grow first rate on it.

A MEMBER: Are the specimens you grew this year equal in size to what you planted?

MR. SNYDER: I do not think they are, but hope they will be better hereafter. The specimens I planted were as large as your thumb and very fine. These are not so large.

MR. ALEXANDER: I would like to hear from E. J. Whitaker. He is in the pecan business quite extensively down South.

E. J. WHITAKER: I have some specimens from trees that are 100 years old, natives of Texas; I have a few budded and grafted trees.

SECRETARY BARNES: Where are they located?

MR. WHITAKER: Liberty county, Texas; right east of Houston, along

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Trinity river, right in the gas section of the country. The modern method is to take trees up to the size of a man's arm for grafting with finer sorts, and also set out grafted and budded trees. It is a very difficult matter to bud them. If thirty or forty per cent. of the buds live they are doing remarkably well; but grafting is proving reasonably successful. We improve the quality by attention to the thinness of the shell, and size and flavor of the nut. Then, also, we see that the nut is filled to each end. Many nuts are inclined to shrivel and not fill the shell to the full extent. A nut that is filled out entirely has greater value than a nut that is not filled out. Nuts that are well filled out will shell about fifty per cent. It is desirable to have a thin shell on account of the weight. I think Mr. Snyder will reach a point where he ought to cut out part of these trees. There they don't think of leaving them under thirty feet apart, and more modern orchards are set out fifty and sixty feet apart. The tree requires a great deal of nourishment. In young orchards they raise cotton and potatoes between the rows. The grafted trees are compared to our Winesap apple proposition here. Two- or three-year-old roots are budded and grafted, and an enthusiastic nurseryman will say they will bear in five or six years, but it is generally ten years before they bear to amount to anything; but the price is increasing so rapidly on nuts of all kinds that ten years even ought not to be a great while to wait. Ten years in that country is no worse than twenty years in this country. There is no backset or frost or anything of that kind in Louisiana and Texas, where a large portion of them are being raised. I wish to say that on the Niles farm, six miles above Topeka, there have been 200 trees set out there for about twelve years.

MR. WILSON: During the past year I have studied the pecan question quite seriously and visited some of the largest and best nurseries of the South, and have investigated the various localities. From what I have observed I find that the pecan tree makes its best growth and gives the best results in the soil around the delta of the Mississippi, and that soil seems to be the home of the fine paper-shelled pecan. There is a vast difference between the Louisiana and Mississippi pecan and that from Texas. They have no strong taste and there is no bitterness in the nut that is grown in the locality I mentioned. The tree is very beautiful and is a deep feeder. If the soil is at all thin it should be thoroughly manured. In the section I visited the trees are not now planted closer than sixty feet, and many of the orchards are set sixty-five feet, so as to give ample room for growth. The value of the nut, as mentioned, has been increasing very rapidly. A grower from Mississippi, one of the pioneers of the South, told me that he had sold all of his crop for this year at eighty cents per pound to a broker in New Orleans. I have paid as high as a dollar a pound for the same kind of nuts myself, in order to get the specimens. Some are so thin shelled that you can easily crush them in your hand. These are highly priced. I wish it were possible for us to grow pecans in Kansas. It might be possible in the southern part of the state. If I were to attempt to grow pecans, I should certainly get budded trees—trees that are budded on a three-year-old or four-year-old seedling roots, and plant in the dead of winter, as soon as I could get them in the ground. Those coming from the South I would plant about the month of January. If you can get them in February it is all the better. They have an unusually large tap-root and will seek moisture. Plant in low

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soil. I noticed in the South the best results come from trees that were planted in low ground. They are far healthier than other trees. I am very much in favor of pecans and wish it were possible to grow them in Kansas.

MR. WHITAKER: I wish to say, in addition to what has been said in regard to the flavor of pecans grown in Texas, a large part of the pecans are grown in the western part of Texas, down on the Trinity river, where the soil is very similar to that of Mississippi, and where, I hope, they will be prolific.

SECRETARY BARNES: I was at the State Horticultural Society at Des Moines, Iowa. They told me that on an island in the Mississippi river there were bushels and bushels of pecans, and hundreds and hundreds of trees, and that the locality was well known and the public had gathered them there many times. Where the island is I do not know, but they gave me some idea of the nuts, and they seem to be peculiar to that island in the Mississippi. As to growing them in Kansas, before I came here I was the owner of a lot of pecan trees bearing every year, nearly, in Montgomery county, at Independence. I had one pecan tree twenty inches through and fifty or sixty feet high. It bore an excellent nut. It was in the way and was cut down. I had many young trees from four to six inches through that bore bushels of pecans and are still bearing, and just over at Bartlesville, in Indian Territory, pecans are brought in in wagon-loads and peddled on the streets annually. I am satisfied that pecans can be grown in Kansas in large quantities if they are planted out.

A MEMBER: I would say that fifty years ago I went to Humboldt, Allen county, to settle. There were pecan trees ten inches through. Following down the river, a little below the Osage country, there were plenty of pecans, and you could go and gather wagon-loads in a very few hours. I helped gather several loads of them. Over where the two rivers come together I have seen them three feet through—native trees—and bearing heavily at that time.

J. L. WILLIAMS: When I first came to Kansas, along the Neosho river, in Labette county, there was any amount of pecans. I have bought bushel after bushel there, but they have cut out the trees to plant corn.

MR. SNYDER: Of course the pecan is a species of the hickory and the native pecan tree has that bitter taste of the hickory. I do not have any idea that it would be possible to raise here the fine budded varieties raised in Louisiana and Mississippi. I have but little hope of raising them here. I have heard it said that the northern limit of cotton production is the northern limit of successful pecan production. I do not know whether that is true or not, but I imagine that it is true. If the successful growth of cotton is the northern limit of the growth of the pecan, I think that we can grow them out in Pawnee county.

MR. WHEELER: I think Mr. Snyder is entitled to great praise for the effort he put up to grow pecan trees. I go past his place every time I go to the post-office. I met him when he planted those trees. He had some left and put them on the outside of the wall on the north side of his farm, right in among briar and hedge, and with his shovel he dug holes and dropped in a few seeds. He said, "I don't know whether they will grow or not," but they grew and are fine trees right now. There is no question but we can

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grow the trees, but, as he says, it seems that thirty-five years is quite a good while to wait for them to bear. Mr. Snyder does not pretend to have kept them in excellent culture; he says they are healthy and very thick.

MY EXPERIENCE WITH FRUIT GROWING IN SOUTHWESTERN KANSAS.

By C. A. BLACKMORE, Sharon.

Once upon a time there lived a man with a small family in the state of Missouri. Not being satisfied with his condition there, and with small chance of getting a home for his little ones, he came to the Sharon valley, of Sharon, Barber county, Kansas, in the fall of 1892. He purchased a small, unimproved farm. A year later he moved to the new home. Having been born and raised in the great state of Ohio, in the fertile Miami valley, where all kinds of fruit grow to perfection, and seeing some fine fruit in the valley of his newly acquired home, he set about to grow some of this fruit for his own use. Having had some training and experience in the nursery business, in the nurseries of Messrs. Geo. Peters & Sons, of Troy, Ohio, under the management—to some extent—of Mr. L. R. Taylor, of Topeka, he planted a small nursery of seedlings. Upon looking over the valley he found here and there a tree of fine fruit that was adapted to the soil and climate. From these trees he took buds and scions for his nursery and began the propagation of fruit-trees that in time were quite a success. But as the neighbors had cautioned him to plant nothing but seedlings, as budded fruit was not successful, especially the budded peach, he planted a seedling peach orchard of a few acres the next spring. But as soon as the young trees began to bud or leaf out, there would be wind- and sand-storms and blow off all new growth, and by the time the season was over the trees were nearly all blown out of the ground and the orchard venture was a failure.

You will remember the years 1893 and 1894 were very windy. In our country, where there is much sand, we had repeated sand-storms. "Its an ill wind that blows nobody good." The next spring the same orchard site was planted to budded peach-trees instead of seedlings. These trees were all well cared for except in the space between the rows. The weeds and grass were as carefully protected as the trees themselves for the first year or two. The neighbors had not been used to seeing such an orchard, and asked sneeringly what was to be done with the fruit-crop. To void answering their questions, the reply was that he was growing hog feed and the trees would make wood and windbreaks. This orchard began to produce fruit and soon brought from $500 to $800 per acre. Other orchards were planted, and when six years old the fruit sold for $1600 per acre. There were 160 trees per acre, averaging ten crates per tree, selling for one dollar per crate.

It is needless to say that all remarks and eyes were turned towards these orchards, and to-day there are hundreds and thousands of trees being planted. It has been found that there are but few varieties of a kind of fruit that are successful. We must study our soil and climatic conditions, learn what is a success in our locality, and profit by the successes and failures of others in like conditions.

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The peach does best on dry, sandy soil. The apple is best on a low rich, subirrigated sandy soil. We cannot get too low for an apple orchard. The Japan plums do well on most soils. Varieties of plums doing best are Burbank, Abundance, Gold, and Wild Goose, in the order named. The Red June bears well, but the trees are not hardy. The Wickson is a very fine plum, but is not hardy either in tree or in fruit-bud.

Cherries always yield a full crop with us. Early Richmond for early, Montmorency for medium, and English Morello for late, are the money-makers.

Gooseberries are a paying crop. Blackberries are quite successfully raised. The Lucretia dewberry could not do better. The Blackcap raspberry has given thirteen full crops in the last thirteen years. The red raspberry has been a total failure. Have tried the Turner, Cuthbert and the Louden for six years without success. But we are fortunate in living in such a great county (Barber), a county that is noted for its great people—Hon. Chester I. Long, Hon. Jerry Simpson, Mrs. Carrie Nation, and Miss Mary Best (the lady stock and alfalfa grower that Mr. Coburn has mentioned so often in his writings). We also have a man, Col. John L. Brady, of Medicine Lodge, who has produced a red raspberry that certainly is very promising. The berry seems to be entirely hardy, healthy, and is a very vigorous grower and yields great crops of the finest of large berries. On my soil this season yearling vines were a literal mass of berries of the finest quality. I will read Mr. Brady's own statement:

"During the spring of 1902 I received from the Green Nursery Company, Rochester, N. Y., a small lot (18) of Louden raspberry plants, which I carefully planted and frequently cultivated during the growing season of that year. Nearly every plant lived and made a fine, luxuriant growth, and passed into the winter of 1902'–03 in an apparently strong, healthy condition. Notwithstanding this, and that the lowest temperature experienced in this immediate locality during that winter was eight degrees below zero, but one plant exhibited any sign of life in the spring of 1903. This one plant flourished and grew like the proverbial Green Bay tree, and concluding that it was a "sport," I adopted the best-known methods of increasing the stock.

"My efforts along that line were rewarded by a nice stand of thirty-two fine, sturdy plants, which were transplanted during the spring of 1904, carefully cultivated during the growing season, and passed through the winter of 1904–'05, when the temperature reached twenty-two degrees below zero, without the loss of a single tip by frost. In the early summer of 1905 they had not only made a fine growth, but were literally covered with an abundant crop of the largest and best grade of luscious fruit ever seen in this locality, many of the berries being over one inch in diameter and of an equal depth. From these thirty-two plants I gathered and sold forty-four pints to my neighbors at 15 cents per pint, thus netting $6.60 from the $\frac{1}{150}$ part of an acre, not counting those used for my own family supply three times daily, preserving and canning during the fruiting season, which lasted from June 10 to July 25, and which doubtless was about one-half of the entire crop.

"During the spring of 1905 I increased my plantation to about the twenty-fifth part of an acre, and from this I picked and sold during the current year over 400 pints at fifteen cents per pint, thus netting a little over sixty dollars, not counting, as before, those used for family supply and canning during the season, which lasted from June 12 to August 14. This is at the rate of $1500 per acre.

"As the canes are strong, sturdy growers, throwing out many laterals, they were completely covered to the tips with large, dark-crimson, juicy berries of the finest quality, forming a sight to behold, so much so that our English colony, which is a large and highly intelligent one, was compelled to acknowledge that the fruit was much larger, firmer, and of a finer flavor

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than the best they had ever seen or tasted in either England, Scotland, or Norway, where the cilmate, temperature, and natural environments are said to be the most conducive to its cultivation.

"In conclusion, will say it is the only red variety of the so-called hardies so far tested in this locality—and I have tried several of them—that will not winter-kill, and will produce year after year a full crop of fruit without winter protection. But anticipating a very cold, severe winter for 1906-'07, I shall anxiously await the result of its effects upon them, and say no more until the spring of 1907."

There are many varieties of the grape that do well in our section of the country. The Early Ohio, Moore's Early, and Campbell's Early are best for early grapes. Ives's Seedling, Moore's Diamond, Niagara, Delaware, Agawam, Hicks, Brighton, Concord, and many others do well. Campbell's Early heads the list for first, second and third early, as it ripens with Moore's Early, is a much larger grape, has large bunches, is a great deal better in quality, and remains on the vines several weeks after it ripens. The Niagara and Hicks are next on the list, with old Concord for the stand-by.

The growing of fruit is not all sunshine, for after we have fought the rust and fungous diseases, the codling-moth, curculio, and other pests, we are confronted with excessive express and freight charges, delays in transit, and dishonest commission men. When all fruit growers are banded together for mutual protection, learn to grade and pack their fruit properly, and deal with honest commission houses, or force dishonest dealers to be honest and give just returns or get no consignments, then may the fruit grower hope to get his just deserts.

WM. BOOTH: I would like to ask the gentleman if he has tried Burbank's phenomenal red raspberry?

C. A. BLACKMORE: No.

MR. BOOTH: I tried them and got four berries; they cost me $1.25 a berry.

B. B. SMYTH: I would like to ask Mr. Blackmore the variety of peach he planted after seedlings.

C. A. BLACKMORE: Varieties of Foster, Early Crawford, !Stump the World, and one or two others. In the same orchard we put 500 Elberta trees that did not produce five peaches, and I never have until this year been able to ship any Elberta peaches. They are a very fine peach, but they certainly are not worth planting in our soil unless they do better from this on.

MR. ALEXANDER: He spoke very highly of the Japan plum and of the Burbank. I would like to ask if anybody knows where the north line is that they will do well. I have tried them pretty thoroughly in our [Norton] county, and north of us, and they are failures; they bloom too much and overbear and kill themselves. If we have a mild winter they will bear, and if we have a temperature down to zero it kills them, and sometimes if we have late rains in the fall it will kill the trees. I don't think there are a dozen healthy Japan plum trees in my county.

C. A. BLACKMORE: As I said in my paper, we should study our climatic conditions and plant such fruit as is successfully grown, and profit by the losses of others. With these Japan plums my neighbor has never had a failure since the trees were planted until this year, and I think I spoiled them because I sprayed them when they were in full bloom.

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PECANS IN JEFFERSON COUNTY.

By EDWIN SNYDER, Oskaloosa.

"Everything comes to him who waits." Fourteen years ago I sent to Texas for a half-bushel of selected pecans for planting They were very large, thin-shelled nuts; just what I wanted. I planted them in a shallow bed of wet sand and in the spring found them nicely sprouted. I moved them to the land selected for the grove and planted them in rows thirty-two feet apart. As I expected to lose some, I placed them four feet apart in the row. This was too close, as nearly all grew. I have never had the heart to thin them, and don't think I shall. They bore a few nuts this year for the first time. Fourteen years is a long time to wait, but I am rewarded by seeing what many of my friends said I never would see—nuts growing on these trees. Some of my friends, upon being informed that it would probably be fifteen or twenty years before they bore, asked me what I planted them for? To such I took pleasure in quoting Horace Greeley (deprecating any personal application). This great philanthropist and statesman wrote: "The lowest in the scale of civilization will labor for prompt pay when pressed by want; only the highest civilized and enlightened will plant orchards and forests for the benefit mainly of generations yet unborn."

I have enjoyed cultivating and seeing these grow from tender seedlings to sturdy little trees from ten to twenty feet high, and knowing I had growing on my farm what none of my neighbors had on theirs.

Why, if I should never get any profits out of the nuts, the grove is worth all it has cost me, just to feast my eyes upon. But I expect to live to see and help gather large crops of nuts. A hundred years from now it will be a stately forest. Its fruit will make glad the heart of childhood and may be my memory will be blessed for the benefaction.

The convention then adjourned to meet at nine o'clock A. M., December 28.

SECOND DAY—MORNING SESSION.

FRIDAY, December 28, 1906.

The meeting was called to order at nine o'clock A. M. by President Holsinger.

REPORT OF THE PRESIDENT.

MAJ. FRANK HOLSINGER, Rosedale.

The past year has been a remarkable one in fruit development and one full of surprises. On May 9 last we were visited by a severe freeze, which we thought would destroy the crop, yet with some exceptions it did but little damage, the exceptions being usually on very low elevations, where frosts are usually most severe. Notwithstanding the fact that this frost was severe in some localities, we witnessed one of the largest crops the state has ever produced. This being the case generally throughout the country, there was such a large crop that it was difficult to dispose of it with prices satisfactory to the grower.

This was especially true of peaches, more because of the lack of facilities for handling the crop than of overproduction. While in Minneapolis, Minn., in August, I had occasion to buy some peaches, and was obliged to pay two dollars for a six-basket crate of Elbertas, which at the same time were sell-

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ing in the Kansas City market for about one-fourth that amount—this by my own people. So the trouble in this case was a want of distribution, as I know, being two months in northern Minnesota. At no time was there a glut of peaches during the two months. True, I was near a town of 5000 people, and it might have been otherwise had a car of peaches been dumped upon them at one time. There are many of these towns that might consume as much as a car if an effort was made by some local agent for their distribution.

Plums were so plentiful that they were a drug on our markets. This was especially true of the Japan varieties. Grapes were the only fruit not in excess of the wants of the people. They were possibly injured by the frost of May more than other varieties of fruits, and the crop was short. This I know was the situation with us.

The apple was a great crop and prices ruled low in the orchards. Owing to large crops in other sections there were no buyers. Apple barrels were high in price. Cold storages were soon filled to their capacity, and thousands of bushels remained with the producer. From personal observation, those who cared for their apples in their homes will make the most out of them. They are not at the expense of packing, barreling, and excessive cold-storage charges.

I would respectfully call your attention to those handling fruits, known as commission houses. They are often "birds of prey" upon the fruit producer. Who of us has not felt their power? An effort is being made through many horticultural societies to induce Congress to pass a national law compelling the commission men, under a severe penalty, to account to the shipper for each consignment sold, amount received, and to attach all vouchers of expense incurred in disposing of their property to the account sales—such as freight bills, express bills, car-service bills, drayage charges, or any other item of expense. In this way one will be able to check up on them. I feel sure that no honest commission firm will object to such a law, which strikes alone at the vultures of the profession.

Horticulture is a broad term. Everything that makes our country beautiful and sweet to live in is embraced by it. Not alone the skilled operations of the gardener and fruit grower, but the landscape builder and forest planter, each are allied with it.

The horticulturist should be an educator of the public tastes, as regards trees, flowers, fruits, gardens, and lawns. In his enthusiasm along these lines he should be infective, thereby stimulating tree-planting by the roadside, the making of parks, adorning cemeteries, and beautifying school grounds.

Such horticulturists are always valued and honored in every community in which they live. One of the greatest needs in every community is this type of individuality.

The horticulturist, to succeed, should be broad intellectually. He should be a man of culture and of science. His knowledge should be world-wide regarding its industry, its markets, its history, and its commercial needs. He should be a representative citizen in his community. This he may accomplish by vigorous efforts to comprehend the sciences which are necessary to success in his profession. He can accomplish much by association with the advanced horticulturists who meet from time to time in conventions

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like this, to study the many problems concerning their profession—that is, the planting, cultivation, varieties to plant, marketing of their products, and kindred subjects.

Much is being done in disseminating a knowledge of horticulture through our public schools. The study of botany, geology, chemistry, and entomology is conducive to this end.

Our agricultural colleges are doing valuable work in their efforts to encourage the youth to believe in the farm as a good place for a home—a place to develop opportunities and carve a destiny commensurate with other professions.

It is unfortunately true that in the past our young men tired of the farm because of its vicissitudes and its hardships, and have sought other avocations in our towns and cities because they offered opportunities which the farm did not.

That the farm has suffered by its depletion of the best blood and brawn is a well-known fact. Owing to developments of the past few years through the influence of these schools to a higher intellectual standing of our farming community, greater inducements are offered to our youth, and many who in the past sought other avocations are now found engaged in farming. I believe the farm is the best place for our youth; that there is a greater amount of happiness to be derived from our country homes than elsewhere.

Our Society is to be congratulated on the number of young men who compose its membership. This work, I feel sure, will be carried forward by them. Being fortified by the splendid education afforded by our state institutions, and with *Ad astra per aspera* as their incentive, horticulture, which has had a phenomenal development in the past, will assume under their direction still greater heights.

REPORT OF TREASURER.

WALTER WELLHOUSE.

Dec. 27, 1905.	Balance on hand as per report of Dec. 29, 1905.....	$554 50
" 27, "	Received from secretary, membership fees.....	29 00
July 7, 1906.	Received interest on Society's funds	24 81
" 23, "	Received from secretary, membership fees.....	5 00
" 28, "	Received from secretary, membership fees.....	22 00
	Total	$635 31
	Paid out in warrants to Dec. 27, 1906.....	66 00
Dec. 28, 1906.	Balance on hand as reported at meeting Dec. 28, 1906,	$569 31
" 31, "	Received from secretary, membership fees.....	25 00
July 10, 1907.	Received interest on Society's funds	24 81
	Total	$619 12
	Paid out on warrants to July 1, 1907.....	62 90
	Balance on hand July 1, 1907.....	$556 22

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REPORT OF THE SECRETARY.

WILLIAM H. BARNES.

The year 1906 has been a year of material progress in all lines of horticulture. More interest is now taken in horticultural work than ever before, not only by our older residents, but by those who have lately come to our state from other states and others who contemplate such removal. Many letters have been received from parties who are considering an investment, and who wisely wish to know whether fruit will grow here. The usual phenomena, which must annually occur in such a large state, did not miss us this year, and we find that some of our horticulturists, both of the careful and toiling variety and of the careless and neglectful kind, are among the successful and the unsuccessful ones. In a year of such abundance it seems strange that some of our best orchardists met no reward. Whether it is owing to uncongenial soil or faulty stock remains to be determined. Whatever the cause, it cannot in any way be taken as a source of encouragement to the careless orchardists, and there can be no excuse for the man whose orchard consists of rows of brushwood, divided by spaces filled with thistles, sunflowers, coyotes, rattlesnakes, polecats, rabbits, borers, and other vermin.

That such orchardists are undeserving is apparent to all; that they should be outlawed and compelled to destroy insects, noxious weeds, and orchard vermin, or else destroy the orchard, is a work the legislature should think over.

Contrary to usual expectations, many orchards that bore well in 1905 also bore abundantly in 1906, showing that 1905 was a creditable year. As is usual in such cases, the trees carried their fruit to maturity and built up at the same time the numerous strong fruit-buds that bore the phenomenal crop of 1906. Insect depredations in 1906 were not as apparent as heretofore—this may have been largely owing to the greatness of the crop; but scab seems to have been rampant. Some counties and many individual orchardists have taken hold of spraying with vigor, determined to find out its virtues. We have just heard from some of these practical sprayers.

PROBLEMS FOR THE GROWER.

One of our most serious problems is how to dispose of our fruit. Berries, which come early, are subject to too much "wild-catting"; sudden telegrams telling of wondrous demand and sales, and asking for immediate and large shipments, often result in the credulous grower losing his boxes and their contents, or getting scarcely enough cash to pay his pickers.

The vegetable gardener, and even the florist, is subject to the same style of robbery. The Wathena and the Fayetteville fruit growers and others have found a way out, which will be explained to you at this meeting. In September, at Perry, Jefferson county, and at Vinland, Douglas county, I personally viewed dozens of wagons loaded with fine Jonathan apples, each waiting its turn to be carefully sorted, and only the finest and best, the really fancy specimens, were taken by the buyers at the munificent price of twenty-five cents a bushel.

W. E. Barnes, of Vinland, one of your oldest members, a grower of long standing, told of one young orchardist who brought a fair-looking load to the buyer, and when his load was sorted he still had all his apples but three bushels, for which the buyer gave him seventy-five cents. To-day these same Jonathan apples are worth $1.25 to $1.60 per bushel. With such

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abominable business methods is it any wonder that many orchardists threaten to cut down their orchards? Must the grower be the slave of the cold-storage man and the speculative buyer? The orchardist invests in lands, in trees, in labor, perhaps in fertilizers, and out of twenty-five cents per bushel he must get interest and expense. The speculator invests in barrels, cold storage, labor, and twenty-five cents a bushel for the fruit, and receives from 200 to 500 per cent. profit on his capital invested, with no fear of insect depredations and scarcely any risk of rot in our modern cold stores.

How long will we suffer this? Look at our transportation companies. They call fruit perishable and risky, and for this reason charge 100 per cent. more than they should; yet they practically never lose any money on this account, for they nearly always throw the blame for any loss on the shipper.

REVIEW OF GROWTH IN KANSAS.

The horticultural statistics, as taken by the assessors, improve annually, and this year returns came from every county but Hamilton. A township here and there failed to make returns, but those of 1906 are so great an improvement over those of 1904 that it is gratifying. There certainly ought to be some premium or penalty attached to this work, as imperfect statistics are misleading or worthless.

There are 1600 assessors and they carry 1900 rolls for us, the totals of which are compiled into 105 reports by the county clerks, which we then condense or compile into a single report. Following is the report, which arrived too late to go into our printed report.

As this enumeration was taken immediately after March 1, it is for 1905:

Trees.	In bearing.	Not in bearing.	Total.
Apple	6,656,144	1,627,340	8,283,484
Pear	243,773	148,166	391,939
Peach	4,624,412	1,052,998	5,677,410
Plum	623,956	192,139	816,095
Cherry	653,301	288,339	941,640
Quince	9,684	4,738	14,422
Apricot	190,843	49,049	239,892
Totals	13,002,113	3,362,769	16,364,882

	Acres.
Vineyards	8,897
Strawberries	3,667
Raspberries	2,230
Blackberries	4,591
Gooseberries	795
Vegetable gardens	26,222

FRUIT GROWN IN 1905.

	Bushels.
Apples	2,447,808
Pears	18,731
Peaches	77,272
Plums	35,523
Cherries	33,470
	24-quart crates.
Strawberries	197,875
Raspberries	43,914
Blackberries	92,591
Gooseberries	7,150
Grapes	602,257 8-pound baskets, which equals 4,826 tons.
Value of fruit	$1,588,172
Value of vegetables	400,903
Total value	$1,989,075

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The value of fruit and vegetables used on the tables of Kansas equals several millions of dollars. Kindly have in mind that these figures are not for 1906. If we had two and one-half millions of bushels of apples in 1905, we surely had five millions in 1906; and if we had 77,272 bushels of peaches in 1905, we had 500,000 bushels in 1906. Most of the fruit-trees growing in this state are younger than this Society, and undoubtedly owe their existence largely to this Society. In twenty-eight years the apple trees have increased 400 per cent., pear 500 per cent., plum 500 per cent., cherry 140 per cent.; grapes have increased 160 per cent.; cultivated berries were almost unknown here in 1875, and now aggregate 11,283 acres. What would this state have been to-day without this Society? It has surely been worth all it cost.

The twenty-eighth report was sent to the printer March 8, but owing to the removal of the state printing plant, delays occurred which were embarrassing We are proud of this report. It has been strongly praised by able men abroad and at home. But it is a mistake to keep it back by making it a biennial. It should be an annual, and the Society should be allowed to issue bulletins, quarterlies, or specials, if needed. Legislation is needed along this line.

Legislation is also needed along the insect line. Other states have laws controlling insect pests. Our state has a law against big hedges and roadside weeds, but the insect loss each year must aggregate many times any loss from above causes. Protection of insect-eating birds is also demanded. While the game-birds and fish are protected for the benefit of the town hunters, the farmer should be protected from these and other vermin. This Society needs more money, more help, more power, and a looser rein. Fruit, vegetables, flowers and their accompaniments are necessities just as much as fuel, flour, and meat. Fruit growing is not fancy work; it is not play; it requires the deepest thought of wise workers. Kansans who are in no way connected with fruit growing always brag about Kansas fruits when away from home, and when at home give it no encouragement whatever.

Membership in the Society should be increased among the younger generation. There should also be more local or auxiliary societies organized. The work of the office has reached a stage where the secretary cannot be out in the state as much as of old. I believe that meetings of horticulturists to which the public are invited would increase the interest and the planting. Again, horticulture should be taught to some extent in our common schools. There are now no secrets in horticulture. Seeding, grafting, budding, cutting, layering, and other ways of propagating are openly known and published daily, and our schools should utilize such practical information.

The State Reform School should be fitted out with larger greenhouses and propagating fixtures, and should graduate a large class of expert horticulturists and gardeners often; it might also furnish all the plants needed for decorating the grounds of the different state institutions. No line of work will have a better moral effect on bright but wayward youth. The Girls' Industrial School should have a similar work, as some of our expert florists and gardeners are of the feminine gender. Every member of this Society should be a missionary for horticulture, especially in influencing the members of the legislature and their own neighbors.

The Society has gained in material eight beautiful tables, paid for out of our contingent fund; but we still have with us the dirty and scarred

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walls, a disgrace to the capitol. Very little fruit came to hand this year, although we did hope to put up a choice collection of peaches.

Several members have died during the past year, as follows: S. J. Baldwin, Seneca; J. C. Thompson and Doctor Murphy, Edwardsville; W. D. Cellar, of California, late of Edwardsville, and Geo. W. Tincher, of Topeka.

It is hoped that you may be so guided in your election to-day that wise and able officers may be placed in charge, so that the Society may keep on the high plane which it has attained, and that its future may be full of usefulness.

PRESIDENT HOLSINGER: I would like to ask the secretary how the statistics are gathered or obtained.

SECRETARY BARNES: This blank (exhibiting), containing fifth-six questions, has columns for answers. These are furnished us by the state printer. They are sent out by your secretary to the assessors in proportion to the population in each township. Some of them contain lines for only thirty-two names; others up to 400 names. After the assessors bring in their work the county clerk is in duty bound to add up all these columns of figures and compile them in one single transcript. He puts all in one single book; instead of the individual names he uses township names. This he sends to us. Then, you see, we have 105 complete transcripts from the 105 county clerks in the state. In this office we take these and spend a month putting the county aggregates together in a condensed work; these corrected and aggregated accounts I read to you from my report. I hope that I have made it plain. It is an excellent thing for horticulture in the state. We have, then, in condensed form, just what we want.

MR. ALEXANDER: I would like to know if the secretary could bring some pressure to bear on the assessors that he sends those books to of the importance of their report. Now, I met the assessors in our townships and I was surprised to find the ill-feeling they had against that extra work, as they called it—don't get anything for it—and some of them almost refused to do it; but I impressed upon them that it was a criminal neglect and they should be treated as criminals if they did n't do it, although generally good citizens and quite worthy of the office; and after they came in the county clerk was as indifferent as the assessors, and I had to keep after them both. I should like some compulsion to make these men more correct, more punctual, and that they be impressed with the importance of it. It is about the only way we can get correct statistics of the state—the easiest and cheapest way. When those books came in I went into the clerk's office and found some of the assessors had taken some of the statistics and some of them had not.

MR. WILLIAMS: We can only get this in a general way. It is a good deal like the commission-man proposition you have talked so much about—there are good, bad and indifferent persons among them. There are good, bad and indifferent assessors. We can get things as long as we can get good men, and that is the only way. Brother Barnes—you had 16,000,000 fruit-trees on that list. Isn't it a fact that we have had reports in years past that said 20,000,000?

SECRETARY BARNES: I don't recall that fact. We got up into the sixteen or seventeen millions, and I thought that it would speak well and was

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near enough in round numbers, and it was a good sign to put up before people coming from other places in the Union. I would just say this in regard to Mr. Alexander's statement, that the assessors do get pay for their work. They get three dollars a day for every day they are out.

A MEMBER: Does the good that is accomplished pay for the labor of getting the statistics?

MR. BARNES: That is a thing for your own decision. I might decide favorably. It is for the Society to say. The statistics that are taken by the State Board of Agriculture are considered very valuable to the state, and the statistics taken by the Horticultural Society are probably fully as valuable in their line. I do not know why they should not be. We are positively in the dark if we do not have something of that sort. We are flooded with correspondence from different parts of the country, and cannot answer the questions at all unless we have some means of getting into communication with the people.

PRESIDENT HOLSINGER: "Stand up for Kansas!" was my thought in bringing out that question. I don't like to see a report that shows that we are traveling backward. People look at these reports. Kansas has a reputation world-wide through these reports, and I think we ought to keep it up.

J. J. ALEXANDER: I think the secretary was perfectly justified. I think precise statistics of the number of trees in Kansas would show even bigger than it is, and I would favor his raising the aggregate to twenty-five million. Even that I don't think would be an overestimate.

MR. SNYDER: I think the main trouble is with the farmers. I know of many farmers that won't supply these statistics at all, and if they do it is in a careless way. If the farmers took the interest in these statistics they should the statistics would be much more valuable and reliable.

SECRETARY BARNES: I can bear Mr. Snyder out. I remarked at Wathena: "You pride yourselves on having more berries in this county than any county in the state. Statistics show you have six hundred acres of blackberries in Doniphan county, but Wilson county, in the south part of the state, shows more." Mr. Kinkead says, "We have got more than Wilson county, but our people have some kind of an idea in their heads that if they give the correct number it will affect their taxes." I said, "I am satisfied you have more blackberries than Wilson county, but it stands on the books six hundred acres for you and seven hundred acres for Wilson county." He told me they were afraid it would affect their taxes; but it don't have anything to do with taxes.

J. T. TREDWAY: I am at a loss to say anything on that subject, but I have been in the business for a number of years and know a little something about the lax methods employed by the assessor and by the farmer, and by the horticultural societies of the counties and state. All along the line there is indifference and carelessness. Now the State Board of Agriculture watches all these matters, and opposite the statistics in their report they give the number and section in the statute and say, "You are expected to do this work."

SECRETARY BARNES: The following is printed on the first page, and again on each subsequent tenth page, in every one of the rolls:

"AN ACT empowering the secretary of the State Horticultural Society to

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gather statistics regarding horticulture in the state and to compile and publish same.

"*Be it enacted by the Legislature of the State of Kansas:*

"SECTION 1. The secretary of the State Horticultural Society shall have charge of the horticultural statistics of the state, and shall furnish blank forms for the use of township trustees, upon which such horticultural matters shall be recorded as are deemed necessary for the enlightenment of the citizens of the state.

"SEC. 2. Such blanks shall show the number of trees or area of orchards, nurseries, berry patches, commercial gardens, cemeteries, parks, ornamental grounds, lakes, ponds, groves, forests, and street trees, and shall be carefully and accurately filled by the said township trustees when on their annual duties as assessors.

"SEC. 3. Such rolls shall be compiled and aggregated by the county clerk of each county, and shall then be forwarded, together with such compilation, to the office of the State Horticultural Society, at the state capital, and all of such matter as is deemed of importance to the public shall be published, either separately or in the annual report of the transactions of the Society; such blanks and their publication to be paid for out of the general appropriation for state printing. (Chapter 404, page 608, Session Laws of 1903.)

"Attention is respectfully called to the above act.

"INSTRUCTIONS.

"*To the Township Trustee:*

"These statistics are not taken for assessment purposes, but that the extent and value of the state's horticultural products may be known. Columns 1 and 2 (addresses) are essential, that we may address the grower for his benefit, and may, if desired, send him good horticultural literature. Please be careful to get correct post-office and rural route number. In column 5 (nurseries) place only the area of ground used for growing trees or plants to be replanted.

"Columns 21, 23, 25, 27, 29, 42 and 56 are to be used where the area is not up to an acre. Five hundred grape-vines will about cover one acre.

"Please do not miss any one; errors and omissions only tend to make the statistics of the entire state unreliable.

J. T. TREDWAY: The Board of Agriculture gets after the county clerks especially, and they in turn get after the assessors, and so that one part of the report by the State Board of Agriculture is more complete than the horticultural report. I know a number of assessors in our county who never carry the book on horticulture with them at all. They say it is "only a repetition of the agricultural report, and does not amount to anything any way." And then again, you go to a farmer and ask him how many of these kinds of trees he has, and he says, "Only three or four trees," and the assessor says "I will let that go," and they put nothing down. Fire a letter down to these fellows and hunt it up. Go after these men and make them get these statistics. Our president has said there is no statistical report made in his town, and I think that is a city of the second class. In the agricultural report it is shown how many cows, horses and pigs there are in the state, but there is no place to show how many trees there are or how many fruit-trees—plum, peach and others—but it is all in acres—how many acres. I believe this thing should begin here at headquarters. The law is all right. Enforce it from headquarters all down the line to the county clerks and the assessors.

JOHN DALTON: I believe there are people in this house who do not place much reliance on what we get from the assessors. We have a law compelling the assessors to take these reports. If the farmer fails to give the

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necessary information—answer the questions he asks—the assessor has no power to compel him to do it. I will cite one instance. In my neighborhood a farmer owned sixty acres of ground. After the assessor got through with him, he said: "Now, how much corn are you going to plant this year?" "Forty acres." "How much wheat?" "Forty acres." "How much oats?" "About thirty acres." "How many acres of potatoes are you going to plant?" "I usually plant from eight to twelve acres." "Any grass?" "Oh, yes, about so much?" "Now," he said, "when I figured that fellow up he had about 300 acres of crops there, when, as a matter of fact, he owned just sixty acres." Now, another instance: The farmers—a great many of them—are like a good many of our business men. They do not think about advertising their business to the world. A great many farmers think: "Here we give these fellows a statement of just what we are going to plant, just so many acres of corn, wheat, oats, grass, etc., and when our crops mature all these fellows that purchase such products have to do is to figure out as near as possible the yield per acre—and they have got this thing all down fine—and make the price for us, and know whether we have a fair production or no production, or however it may be, and they have a price laid out for us," and so some farmers absolutely refuse to give the information asked for. I don't know but it is all wrong. I don't believe in publishing to the world our business and just what our profits are.

C. C. Cook: In reply to this member, as to the excess of acres planted. A man has the same right, and it is his duty, to give in every acre of land to the assessor that he rents, the same as though it was his own individual farm. Your tenant has a right, and it is his duty, to give in what your land possesses, because you are not on the land and are not supposed to know what is there.

Phillip Lux: In regard to farmers being backward in giving reports—farmers, some of them as least, have an idea that giving these reports gives the middlemen a chance to figure out and get ready to take the crops, and according to these reports the calculation that the middleman makes are often misleading. It depresses the market, as, for instance, the last apple crop. The fruit journals and shipping journals all had this report brought down to figures showing that there would be such an overproduction of apples as to make them practically worth nothing, and they were willing to pay nothing for them, and the result was, when we went into the apple-picking season there was absolutely no market for them—we had no market that would justify apple-growing. This also holds good, in a great many instances, with all the products of the farm. A great many farmers are now of that opinion, and are not giving correct reports. They don't want to give them. They don't want to give the world a knowledge of their business, because it has been a detriment to their business. They have a feeling that the reports have given certain classes of men who sit at desks and tables with pencil and paper, even furnished free, to compute our crop before it is half matured. The apple crop was measured in early fall before it was half grown. The reports went out, and it was a detriment to fruit growers. That has been impressed upon the farmer and fruit grower to a large extent, so they avoid answering the fruit questions put to them by the assessor.

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REPORT OF THE OFFICIAL ENTOMOLOGIST.

By Prof. E. A. Popenoe.

I have had unusual opportunity for orchard examination during the season past, arising from my inspection of fruit plantations in connection with the search for dangerous insects, with which I am charged as entomologist of the State Agricultural Experiment Station; and while my investigation has not resulted in the discovery of any important pest out of the common line, excepting in the case of the San José scale, noted later in this report, it has placed me in possession of data that should be of interest to this Society, which I wish to offer in the present connection.

As many of my orchard visits were made at the time that the crop was well in sight, or was being harvested, my attention was forcibly called to the condition of fruit and tree with respect to injury due to the usual enemies—scab, black rot, codling-moth, curculio, and various leaf-feeding insects—and I have been much disappointed to find that there are yet so many orchardists that have not given attention to well-established methods for the prevention of the work of these and similar enemies to good fruit and remunerative prices.

By way of a preliminary statement of conclusions, I will say that everywhere the intelligent use of proper preventive means has brought ample success, and the failure to employ such means has brought unsalable fruit and disappointment in the business. And this difference has not been partial, but has been so decided that it seems impossible that there should remain men who read the abundant output of the horticultural press to so little advantage as do those who have failed or decline to get good apples. If the proposition were still in the experimental stage, this indifference might be excusable, but it is quite the contrary.

The factors of poor health and little profit that have been most noticeable in Kansas orchards are several: Wrong position or situation; poor soil; poor culture, and weeds; close planting with non-pruning; insects (codling-moth, curculio, leaf-caterpillars), and fungus diseases (scab, black rot).

Wrong position is apparently a cause of failure in a few cases. Orchards on high ground, or on low ground, in most cases succeed alike, if the situation has regard to the local conditions, especially those where the relation of high to lower ground is noted. In a few cases orchards on low ground surrounded by hills have proven unprofitable in spite of good soil and culture, through their susceptibility to late frosts. Such cases are not very common, as experience with other crops has apparently taught the planter to avoid this obvious danger. In a few cases, however, the distinction has been well marked within the same orchard situated on rolling land.

The drawback of poor soil is one not commonly found in the fruit regions of Kansas, where most soils are well adapted to the growth of the apple and other tree fruits. Most orchards, therefore, show a growth and character of tree that leaves little to be desired, and it has been rare, in my experience, to find soil alone the cause of ill success in fruit growing. Certain localities in the southeast, south-central and central counties have thin soils of stiff, lifeless character that render them distinctly unfit for orcharding. In some localities where orchards are planted with little profit the soil is not deep, and it is too closely underlaid with rock to permit of full, healthy growth, or to enable the tree to resist occasional drought. This defect is

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relatively so rare, however, that its extended consideration here is not necessary.

Poor culture is the occasion of more frequent trouble. The evidently prevalent opinion that the fruit-tree, because it is a tree, needs no more attention to cultivation than does the roadside elm, is one that cannot be too strongly or too insistently combated, if marketable fruit is the object of the planter. Fruit, it is true, is produced under non-cultivation, but too much of it is that class of fruit that gives rise to the notion that the apple business is overdone—that is, apple years the market is glutted—that orcharding does not pay, and similar delusions.

By culture no special system is meant, but some system must be adopted by each orchardist if success is to be attained. The method must be selected after a study of the particular soil and situation of the orchard. In the extensive orchards of Reno county, the long-continued use of the cultivator has been found to bring trouble, because the light, sandy soil, when kept clean of growth under the hot summer sun, reflects the heat to such a degree as to injure leaves and fruit. The mode of treatment under such conditions must therefore provide a permanent soil-cover to obviate this danger. In the absence of large or tenacious perennial weeds this is accomplished by the constant use of the mower, the cut herbage remaining on the ground as a mulch and source of humus. The health of some of the most profitable orchards in that region attests the logic of this treatment.

In another famous group of orchards, near Parker, some of the healthiest trees are found where the owner had followed level surface-culture till bearing time, and had then seeded the clay soil to red clover. This herbage, when established, was mowed regularly in season, and generally left lying on the ground, for the reason, apparently, that the stand was only moderate and hay was not considered the main crop. But in this orchard it was noted that the owner grazed both sheep and dehorned cattle, as he claimed, with great advantage and with no appreciable injury. The condition of the orchard in general was to all appearance very satisfactory and the crop was all that could be desired.

In most orchards the mower seems to be in favor as an implement of orchard culture, and, while on level ground I am convinced that the disk or cultivator is far better, as a rule, it must be accepted that the use of the mower is greatly superior to no cultivation at all.

One of the most discouraging orchards that it has been my fortune to see is not far from Troy, where the soil and situation are ideal, as attested by the general tree-growth on neighboring plantations. In this orchard of six or seven years of age, red clover is grown for seed. Through the work of pocket-gophers the stand of clover was very poor, and permanent weeds had taken hold. The herbage growth had thus attained considerable mass and variety each summer before mowing, with the result of greatly diminished tree-growth, and the encouragement to the greatest possible degree of the dangerous buffalo treehopper, which had fairly riddled the trees with egg-punctures. The condition of this orchard of forty acres was such that its ill-health was evident at a distance. In such a case, complete recovery may easily be had by open culture until more age is attained by the trees, though, owing to the slope of the land and the danger of washing, the soil should be bound by some favorable grass as soon as permissible.

I have seen a few orchards where the moderate pasturing of hogs was

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practiced, and, while such a method has its obvious disadvantages, I do not believe it the worst treatment to which an orchard may be subjected, and it has some enthusiastic advocates. There can be no question as to the influence of this method in reducing the sum total of insects, and windfalls are certainly good hog feed. The added fertility of the soil is also a good not to be overlooked. The objections to using the orchard as a hog pasture are some of them esthetic, but they will none the less have their due weight with most fruit growers.

The least defensible system of orchard treatment seems to me to be the complete let-alone system. I do not believe that it is wise to disregard so completely the requirements of neatness, practical conditions aside, as to allow the orchard ground to grow up without hindrance as a weed and brush thicket. Where sunflowers, horseweeds and sumac of two or more generations are all summer long as high as the trees it seems like an insult to the sensitive natures of brothers Jonathan and Grimes, as well as an evident encouragement to all the rusts, scabs, curculio, and other pests, who seek darkness rather than light because their deeds are evil. I am glad to have seen that this mode of orchard culture has little advocacy, and I believe we are witnessing its decline.

Close planting is evidently another source of discouragement in orcharding. I have seen 160 acres of apple orchard where the trees, set twenty feet apart, and now about twenty years old, without pruning or training of any sort, form an impenetrable thicket. No treatment of tree or fruit is possible in this orchard. Fortunately there were no apples to gather, as it would have been impossible to get into the orchard with a wagon to haul them out. The tree-growth in this orchard is certainly sufficient for any requirement. It cannot be that the soil is lacking, yet it is absolutely unprofitable. Double the space between the trees, and treat the orchard as demanded by the conclusive experience of successful apple growers, and the owner should be making good money out of his plantation. But he now offers to lease at $2.50 per acre, a high price to pay for the crop on the trees when I saw them.

A mile south of Sterling is a forty-acre apple orchard set twenty-four feet apart, the trees now twenty years of age. Profitless to its former owner, this orchard changed hands three years ago, greatly to its advantage. The new owner started in to prune out the excess of wood, and most of us would think the life of the orchard endangered by the severe pruning it had received. However, it is now possible to get between the trees with a power-sprayer, and the treatment has from the first seemed to impart new life and vigor to the trees, while the good crops of salable fruit which the orchard has since exhibited have convinced the owner, at least, of the propriety of his method. It may be assumed, however, that no system of pruning can offset the final disadvantage of too close orchard planting. It is practically certain that the alternate trees will not be removed in time, however conscientiously such removal is planned.

Much less objectionable is the method of close-planting in the row one way, which does indeed permit of most orchard operations after the trees are full grown, but I think that the conviction is growing among orchardists that even this method has its positive disadvantages. In estimating the true value of this method, allowance must be made for local conditions with

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regard to sun and wind, exposure to which in some places is as beneficial as it is injurious in others.

It has been the dogma of Kansas horticulturists for years that there is little need of pruning under the conditions of growth and environment in our apple-growing regions. I believe that this is still true in large degree, if we are to choose between the severe formative pruning advised in the old text-books by Eastern writers, and the let-alone method. But observation upon the results, of the two methods has forced me to adopt a middle ground, and to conclude that the proper standpoint with regard to pruning must be gained by the observant orchardist through a close and logical study of conditions in his own region, or perhaps even in his own orchard, each for himself. I am convinced that the non-pruning system, carried out literally, leads to grief as thoroughly as does the method of the tree butcher. I note, however, that those orchardists who are unwilling to get something for nothing in the way of a fruit crop are getting into the habit of pruning to the extent unmistakably indicated by their conditions, to the great advantage of their plantations in beauty, convenience, and both quantity and quality of fruit. Thus one orchardist has rejuvenated his forty-acre orchard by a severe heading-up or cutting-out of lower branches on trees in their decline of life under the reverse treatment. Another, whose financial success, in which he is alone in his locality, puts the stamp of approval on his methods, which practices a severe shortening-in, makes, so far at least, wholly for good in the quality and quantity of marketable product, as well as for convenience in orchard operations. Others, and there are several extensive orchardists in this class, are getting better prices for their fruit because of the smooth surface and high color secured by annual attention to the thinning out of the dense lower portions of the tree head.

That all of these have struck a proper method in their several circumstances is evidenced positively by their own results, and, under comparison, by the failure in some degree of numerous orchards, even in their own localities, where a strict non-interference with tree-growth is the established method.

INSECTS.

Coming now to those considerations that may seem more legitimately a subject of discussion in the report of your entomologist, it is a cause of extreme regret that so many are yet uninformed or are unconvinced as to the advantage of modern methods of warfare on insect and fungous tree pests. I am satisfied if the balance-sheets could be published showing the returns of growers that I might specify in Reno, Morris, and Linn counties, for example, in comparison with some that I might specify in Doniphan, Crawford, and Shawnee counties, for example, that there would remain little need of argument. Those in the former group are instances of that class of men who do not fear a glut in the apple market, because they are really not in competition with those who suffer from the low prices consequent on a full crop of fruit of the character that causes the glut. Their fruit, abundant, of fine size and color, thoroughly matured, and free from blemish, commands a good price in the market, whatever the crop; while that of their less energetic neighbors, though equally abundant, lacks in all the other qualities, and they are thus little better off in years of a full crop than they are in years of failure.

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There are many apparently profitless efforts honestly put forth in the line of insect control, the failure under which is especially to be deprecated because of the unfortunate diminution of faith in the process. It is not unusual to hear men declare that after trial they have "lost all confidence in spraying," with no very good idea as to what may be included properly under that very broad term. *Spraying* is a handy and almost perfect *mode of application* of certain tree medicines of indisputable value. Arsenic *will* kill the apple-worm, or the canker-worm, or the tent-caterpillar, or the potato-beetle, or the grasshopper. Copper salts *will* protect the leaves and fruit against the spores of the destructive rots, scabs, and rusts. Is there any one so hardy as to deny these two propositions? Unfortunately there is still now and then one, yet their truth is as well attested as that manures on poor soils make plants grow more strongly.

The reasons for the failures of orchardists to gain success and consequent encouragement in their work in spraying after giving the method, as they think, a fair trial, are not in all cases to be discovered. In many instances, however, I have been able to find the cause in wrong methods, in the lack of the requisite care in preparation, and in ignorance of fundamental facts, either defect being sufficient to render futile the application, though undertaken with the best of intentions.

It is undeniable that satisfactory results are much more apt to follow in the operation of an adequate machine than in the use of a sprayer of insufficient capacity and delivery. A power sprayer is more likely to bring success in the work than one operated by hand, for the reason that it does not tire, and proves more certain as a supply of needed force. The operation of a hand spray-pump is never too well done, especially in the hands of some one beside the owner of the trees; while the same opportunity for inadequate service is not present where an engine does the work. In the commercial orchard the hand sprayer certainly has no place.

While the preparation of the spraying mixtures should offer no difficulties to one naturally careful and capable of reading clearly the readily available instruction for the work, it is yet true that careless hands will bungle even such simple directions as those under consideration. I asked one of the helpers of an orchardist whose voice was lifted against the use of Bordeaux mixture how his employer made the mixture, and was informed that after dissolving the bluestone in water, he took a piece of stone lime as large as he thought right and slaked it in a pailful of the bluestone solution, calling the mixture "Bordeaux." Under such careless methods it is not strange that disappointment should be the only result. Similar difficulty underlies many failures. When we shall have persuaded such operators to follow directions much of the trouble with spraying will vanish.

Too frequently there may still be found those who do not know that however excellent a certain combination may be against the enemies of a certain class, it may have no value whatever against those of another. Thus it occurs that the aid of "Bordeaux mixture" is invoked against the codling-moth or the canker-worm, or that of an arsenite against the fungous diseases of the tree. Yet the operator is persuaded that he has "sprayed," and that the practice is not only expensive but useless. Such experiences are still so numerous as to warrant a continual repetition of the first principles of proper spraying methods in our horticultural publications.

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THE SAN JOSE SCALE IN KANSAS.

As most of the members of this Society are aware, since the date of my last report the San José scale has been discovered in our state under conditions which make it necessary that we recognize the established presence of this formidable pest among our plantations, and no longer rest in the complacent belief that we are specially exempt from the dangers of its spread.

The most important infestation is at Dodge City, where it was discovered through the horticultural interest of Mr. B. S. Williams, a resident of the city, who, becoming aware of the diseased condition of the fruit-trees growing on his own grounds and those of his neighbors, sent to the horticultural department of the experiment station a twig covered with what he thought to be a destructive fungus. The specimen was referred, on receipt, to the Department of Entomology, and the determination of the supposed fungus as the true San José scale on our part was later confirmed by Dr. Howard of the United States Department of Entomology, at Washington, on the basis of specimens forwarded to him for examination.

As soon as the true nature of the attack was assured, the writer made a visit to Dodge City to determine the extent and conditions of the infestation. An examination of the locality showed several apple trees of ten years of age thickly incrusted with the insect, and in most of the residence lots of the city in that quarter the condition was the same, the fruit-trees of all sorts showing the insect to be present in greater or minor abundance. Here and there was noted a tree of the apple, pear, or peach so thoroughly attacked that it was dead or dying, while others showed the presence of the scale in smaller quantities, permitting the relief of the trees if prompt measures were then taken for the destruction of the pest.

Beside the sorts of fruit-trees above named, inspection showed the following to be more or less infested: Native and cultivated plums of all varieties, the apricot, the plumcot, the grape, the currant, cherries of several horticultural groups, roses of several types; and among ornamental or shade trees the Osage orange, the Russian mulberry, and in one case a small tree of the Carolina poplar or cottonwood.

So far as ascertained the scale did not occur on box-elder, Black locust, Honey locust, elm, althea, the honeysuckles, spiræa or Virginia creeper, though plants of these sorts, among others, were growing among or near infested fruit-trees. On the whole, however, the infestation was as serious as might be feared anywhere, including within the limits of the area about a dozen blocks in ward 2 of the city, with scattered cases outside this general section. An attempt was made to locate the site of the original infestation, but without result, owing to the general and even distribution of the pest within the area indicated. It was also found that suspicion could not be placed with likelihood of proof upon any nursery, as the trees have been largely purchased from agents, and the places where they were grown were not known originally, or were not on record.

For the information of those who have not seen this insect, it may be described as a small sap-sucking louse or mite, active when first born, but soon becoming immovable on the bark, leaf, or fruit, and secreting then a flattened protective scale over its body, losing at the same time its more obvious insect structure, devoting its energies thereafter to feeding on the

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sap of the plant, and producing young in great numbers. In cases where the scale lice are in moderate numbers, they will occur in small colonies or groups, or scattered singly over the bark, presenting then no striking mark to the vision unless one is looking closely for them. When scattered in this manner on the light-colored younger bark or other green tissue, there is generally visible a somewhat reddened area about each insect on the surface of the plant, a feature which leads to their more ready recognition. The adult females are the largest scales, slightly irregular in their convexity, of a dull gray or lighter color, with a distinct boss or center of a different color and appearance. Young scales, also abundant at any season, are smaller, more distinctly circular, and of a darker color, often nearly black. All sizes occur together in the clusters, frequently so crowded that the true color of the bark is not visible for the scurfy covering consisting of the numerous insects.

In May, and at intervals thereafter, the females give birth to young, and these travel over the bark in search of unoccupied spaces, which they occupy and then begin the secretion of the protecting scale as above. With several indeterminate broods each season, the new growth is occupied almost as fast as made, and the tree is not able to outgrow its enemy. The injury to the plant is done by the abstraction of the sap from all its parts by the thousands of beaks throughout the entire growing season.

Owing to the form and feeding habits of the scale lice, the effective agents in their destruction are practically limited to the various washes and sprays that act as contact poisons or corrosives. Among these are crude petroleum, coal-oil, resin washes, and combinations of lime and sulfur among others. Several of these are open to the objection that while destructive to the insects they are also more or less likely to injure the tree. Others cannot be relied upon to kill the insects in all stages, necessitating the frequent repetition of the treatment. If the trees are in leaf perhaps as satisfactory treatment as any is the application of a spray of moderately strong kerosene emulsion, previously preparing the trees by pruning off all that can be spared of the branches, to reduce the surface to be operated on. The application of this spray should be several times repeated during the spring and summer. This treatment will not be completely effective, but will serve as a temporary check to the spread of the young scales until the winter treatment can be undertaken. This winter treatment, undertaken in mild weather any time during the dormant season of the tree, consists of a thorough wash or spray of the lime-sulfur-salt mixture found so satisfactory in eastern orchards.

The presence of this serious pest in Kansas orchards in several widely different localities should warn us that our state should be no longer without the protection of an effective inspection and quarantine law controlling the sale and shipment of trees and other nursery stock likely to transport this dangerous insect, and providing for the inspection of orchards generally over the state.

I visited Troy at the time of apple picking. The trees were simply loaded down with fruit all along the way, trees breaking under the load. The per centage of packing apples was miserably small. I put in quite a bit of time talking with one of the packers of that town, particularly about the insects which had shown in the fruit the evidences of their abundant pres-

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ence. He said that no one had tried spraying in the proper way, and a few had tried dust spraying. It seems to me that it is now time to knock out the dust spraying. I did visit one section where a man complained of want of success—that he was not getting results from spraying. I asked him what attempts he had made to control insects and pests that were very abundant, as the trees would show. I found that he had tried dust spraying one year, and it has put him entirely out of faith in the name of spraying. That is one of the things we now have to contend with, to bring people to understand that spraying of one sort is quite different from spraying of another sort. I think that the opposition to spraying, that is too evident here, comes mainly from those who have failed through their lack of attention to some detail, which would cause failure. It is not that arsenic will not kill the insects, because we have established this for thirty years past by abundant and uncontroverted evidence, but it is that some little slip in the method has rendered the effort of no avail. It is absolutely necessary, if spraying is to be done profitably that it be done carefully and not at haphazard.

The insect that has proven of more interest than any other during the present year is the San José scale. I have some samples from a Dodge City plantation, and I wish any one interested in trees and doubtful of the danger which comes from our loose methods in this state, particularly in the importation of trees, would visit the second ward in Dodge City. Mr. Williams, who is an engineer on the railroad, living there, said there was something curious on a tree, and he didn't know what it was. I have the specimens here and you can see if there is anything odd-looking about it. It was covered from top to bottom. There was not a place where you could put a pencil-point without touching San José scale.

I noticed growing there an Osage orange tree, twenty-five years of age, perhaps, which was coated from top to bottom. Wherever the rough bark would permit of the settling of these insects near enough to get at the sap they were thick.

Osage orange trees in the town were full of them. They were also on the apple, pear, peach, plum and cherry. On the specimens I have with me the scales are all dead, absolutely. We have taken care of that. But they show the appearance on the young tree, and the older one as well.

J. L. WILLIAMS: Professor, along about the middle of the paper you said that in the nurseries and orchards nobody had ever found any San José scale in the state and about two minutes afterward you said we have lots of it.

PROFESSOR POPENOE: I said that at our last report we had lots of it. Of course this was true. The reason, gentlemen, that we did not find San José scale was this: While inspection has been going on for about ten years past, we had no thought of going to Dodge City for tree pests, because we did not expect to find trees there, but the inhabitants of that town have grown many trees under irrigation. With regard to the application of these washes I told of, I found that whale-oil soap loosens up the scale so that I could go to the tree and wipe it off freely. A larger portion of the scale loosened by the whale-oil soap is apparently scale of the dead insects, so that the wash left the trees looking fairly decent, although the evidence of San Jose scale was still there. However, we found that under the best of these applications, there was, after treatment, a recognizable proportion of the insects alive, I should say from five to twenty-five per cent., according

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to the material used. Whale-oil and a caustic-potash soap give the best results in destroying the scales up to a certain period. The use of the lime-and-sulfur mixture seems to have done the work more thoroughly than any used. It is hazardous to apply this when leaves are on the tree. We did our best to try and stir up the town of Dodge City, but there is a good deal of opposition to it. We went to the mayor and city council and merchants to try to get them to take notice of the matter, but the best we could do was to get a notice in the county paper. I think the case is severe enough to declare the trees a nuisance and have them cut down.

WILLIAM CUTTER: Have you used salt?

PROFESSOR POPENOE: Yes, sir. The salt seems not to be necessary. Lime and sulfur alone are sufficient. It seems a case like this should make plain the necessity of some legislation which will enable those in charge of the inspection this fall to put out, in various territories, people with some authority. The people at Dodge City don't care to have you come on their premises. They don't want you to touch their trees. I would say that since the discovery at Dodge City we have found the presence of San José scale in Rice county. Two trees were found infested. These were Bismarck apples, which were declared to come from one of three nurserymen; but who they were the owner would not tell. We should have some way to get after these men and force them to give the source of their importation.

GEO. A. BLAIR: What about the caustic wash?

PROFESSOR POPENOE: The sulfur and lime solution is so much cheaper it is hardly worth while to displace it with anything else. The whale-oil is a very good one. We cannot possibly eradicate, but we can keep it under control. But the whale-oil and caustic soda wash may be used upon growing as well as dormant trees. It is rather an expensive soap, though. It is much more expensive than the mixture. And I should recommend, in case of attack, that we limit our efforts to the use of the lime and sulfur mixture in winter. Use it then and put it on thick, and it is almost a certain preventative. It will destroy the young if the old scales escape it. Properly used, it is the best thing that can be done. I am satisfied of this from the testimony of the nurserymen.

MR. BLAIR: What caustic preparation do you use?

PROFESSOR POPENOE: Whale-oil, caustic soda and soap. Whale-oil will kill in a great many instances. Fish-oil does very good work alone in many instances.

A MEMBER: By what means can San Jose scale be transferred?

PROFESSOR POPENOE: Many different ways. It is claimed it can be blown by the winds. It certainly is carried by birds and other insects. In fact, entomologists have discovered the San José scale young carried on the body of the ladybird to other trees, and centering there. One peculiar thing about this San José scale is that they give birth to young without impregnation by the male, and if one of those scales carried from one tree to another happened to be a female it would start a new colony.

A MEMBER: Would crude petroleum destroy them?

PROFESSOR POPENOE: To a degree, but it has not been found satisfactory.

WILLIAM BOOTH: Won't it destroy the tree also?

PROFESSOR POPENOE: It has some danger to the tree.

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CREATING A STATE ENTOMOLOGICAL COMMISSION AND MAKING AN APPROPRIATION THEREFOR.

Session Laws 1907. (Page 554.)

AN ACT for the protection of the horticultural and agricultural interests of the state of Kansas by the suppression and extermination of San José scale and other injurious insect pests and plant diseases, to create the Kansas Entomological Commission, two state entomologists, and to provide for the punishment for violations thereof, and making appropriations therefor.

Be it enacted by the Legislature of the State of Kansas:

SECTION 1. That State Entomological Commission shall be established by the state of Kansas; that its purpose is to suppress and eradicate San José scale and other dangerous insect pests and plant diseases throughout the state of Kansas.

SEC. 2. That this State Entomological Commission shall consist of the secretary of the State Board of Agriculture, secretary of the Kansas State Horticultural Society, and the professor of entomology of the University of Kansas, and the professor of entomology at the State Agricultural College, and the fifth member to be a nurseryman actively engaged in the nursery business within the state of Kansas, to be appointed by the governor, whose term of office shall be two years. The secretary of the State Board of Agriculture shall be chairman of this commission, and the commissioners' secretary shall be the secretary of the State Horticultural Society.

SEC. 3. That the expenses of said commission shall be paid out of an appropriation hereinafter provided for, and that said commission be vested with all powers necessary to carry into effect the provisions of this act, but no expenses shall be incurred beyond the amount appropriated.

SEC. 4. That it shall be the duty of the said state entomologists, under the control of the State Entomological Commission, to seek out and suppress pernicious insect pests and injurious and contagious plant diseases hereinbefore mentioned as destructive to the horticultural and agricultural interests of this state, and conduct experiments when necessary to accomplish that end.

SEC. 5. In order to accomplish the purposes of this act, the state entomologists, their assistants and employees, appointed, are hereby authorized to enter upon any public premises, parks, cemeteries, or other premises, or upon any land of any firm, corporation, or private individual, within the state of Kansas, for the purpose of inspection, destroying, treating or experimenting upon the insects or diseases aforesaid. Should any insect or disease found by the state entomologists, or by any other officer appointed by the said commission, be, in their opinion, capable of eradication without the destruction of the trees, plants, shrubs, vines or grains, then said officers are to treat or cause to be treated with proper remedies and appliances all such trees, vines, shrubs, plants and grains. Further, said state officers shall treat or have treated, in order to prevent the dissemination of the aforesaid insects or diseases, any and all suspicious trees, vines, shrubs, plants and grains found to be in a dangerous proximity to those infested as aforesaid.

SEC. 6. That should any of the officers aforesaid, through their assistants and employees, or by any notification whatsoever, find any trees, vines, shrubs, plants or grains infested or diseased with the aforesaid insects or diseases, the aforesaid officers shall mark or tag in some conspicuous way,

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all trees, vines, shrubs, plants or grains infested with aforesaid insects or diseases, and shall give notice in writing to the owner or owners, tenants or person in charge of such premises of the condition thereof; and thereupon, if such person or persons so notified shall not within ten days after notification destroy or treat the same in accordance with regulations and rules of said commission, a copy of which will be sent on application to any person, then said commission shall, through their officers, assistants or employees, destroy or treat all such trees, vines, shrubs, plants or grains, and the state entomologists having in charge such destruction or treatment shall file a statement of the expenses of such destruction or treatment with said Entomological Commission, and said commission shall transmit a copy of such statement and account of such expenditure, with the proper affidavit attached thereto, to be made by the state entomologist under whose supervision said destruction or treatment was done, which shall be sufficient evidence to prove the claim to the county attorney of the county where such premises are located, and said attorney is directed to collect the same, and account to the State Entomological Commission.

SEC. 7. That it shall be the duty of the state entomologists, under the control and direction of the State Entomological Commission, to inspect annually all grounds within the state where nursery stock is grown. If no evidence of dangerous insect pests or plant diseases is found, a certificate of inspection shall be issued to the owner of said nursery stock, upon payment of five dollars and the actual necessary expenses incurred in making such inspection, giving the name in said certificate of the state entomologist conducting such inspection; said five dollars to be paid to state entomologist conducting such inspection. Said certificate of inspection cannot be altered, and will be valid until the 1st day of the following June. If dangerous insects or plant diseases are found in nursery stock, orchards, or other trees, vines, shrubs or plants, then said nursery stock, orchards, or other trees, vines, shrubs or plants shall be subject to the provisions of section 6 of this act.

SEC. 8. That in order to prevent the introduction or spread of any injurious insect pests or plant diseases into the state of Kansas, no nursery stock shall be brought into the state nor offered for sale within the state without having previously been properly inspected, as shown by an accompanying certificate. If, however, by reinspection by either state entomologist, their assistants or employees, injurious insects or plants are found, the nursery stock thus inspected shall be subject to the provisions of section 6 of this act.

SEC. 9. Any person violating any of the provisions of sections 5, 6, 7 and 8 of this act, or offering any hindrance to the carrying into effect the provisions of said sections, shall be adjudged guilty of a misdemeanor, and upon conviction shall be fined not less than ten dollars and not more than one hundred dollars for each and every offense, together with all costs of prosecution, and shall stand committed until the same is paid. It shall be the duty of the county attorney to prosecute all violations of this act, and fines so collected shall be paid into the county treasury of the county, for the benefit of the school fund.

SEC. 10. The state entomologists shall submit annually a written report, on or before the 1st day of December, of their inspections and investigations, to the State Entomological Commission, which shall be transmitted by said commission to the governor of the state and the state legislature,

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and published as are the reports of other state organizations; said reports to be distributed to the citizens of Kansas, upon application to the State Entomological Commission.

SEC. 11. To defray the expenses authorized by the provisions of this act other than those pertaining directly to the issuance of certificates of nursery inspection, the following sums are hereby appropriated out of money in the state treasury not otherwise appropriated, viz.: The sum of five hundred dollars for the fiscal year ending June 30, 1908, and the sum of five hundred dollars for the fiscal year ending June 30, 1909, no portion of which shall be used for salary or compensation for any one who at the same time is drawing a salary from the state of Kansas.

SEC. 12. All bills and accounts of said State Entomological Commission, or its agents, shall be approved by its chairman and secretary, and the auditor of state is hereby authorized to issue warrants upon the treasurer of state for the amounts and purposes of this act, upon vouchers duly verified by the aforesaid chairman and secretary.

SEC. 13. This act shall take effect and be in force from the date of its passage and publication in the statute-book.

Approved March 1, 1907.

PRACTICAL SPRAYING BY PRACTICAL MEN.

By WILLIAM NEWLIN, Hutchinson.

Mr. President, Ladies and Gentlemen: I will endeavor to tell you the story as I know it down in our own field. Here is a letter that Secretary Barnes has received from Mr. Underwood, and I might read it to you:

"HUTCHINSON, KAN., December 27, 1906.

"*Mr. W. H. Barnes, Secretary State Horticultural Society, Topeka, Kan.:*

"DEAR SIR—I have been under the weather for several days, but expected up to to-day to be able to leave for Topeka to-night, but my doctor tells me that I cannot go. I am very sorry to miss this meeting and have it in my mind to leave to-morrow night and be there Saturday, if possible. I want to be there especially for what good I will get out of it, and perhaps our experience of spraying this year would be of benefit to other parties who had not sprayed thoroughly; but I think that Mr. Newlin can cover this very thoroughly, as we figured that over together and I believe sprayed about the same time and in the same manner, with practically the same results.

"I do not think that I need to impress upon you the importance of getting up a bill covering the apple pests of the state, and if there is any chance of the nursery people defeating such a bill I believe that the nursery-inspection part of it may be eliminated in so far as it makes it obligatory; but we want, first, last and all the time, the law appropriating the money to carry out the work; second, a pest officer who has known ability (and I suggest Professor Popenoe); and third, we want the law good and strong that the pest officer has the authority to require the owners to spray under his directions for San José scale, especially, and, if that does not eradicate it, after having used all the known methods, the pest officer shall have the power and authority to cut out the trees that in his opinion are so badly infected that they are a menace to the rest of the trees in that orchard; and I believe that this wants to made so strong that there is no appeal to any county commissioners or any other party who does not know any more about San José scale than a Newfoundland dog. Where there are loopholes of that kind in a law, the owner of the scale-infested trees can defeat the object of the law by stays of one kind or another and drag the thing along over the whole season, and I do not believe in that kind of a law.

"Yours very truly, W. H. UNDERWOOD."

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We in central Kansas feel that there is more danger from San José scale getting into our orchards and injuring and killing our trees than from all other pests that come and go. It seems to me that we ought to have a strong committee to assist the officers of this organization to frame and try and get passed, before this legislature closes its session, a good law.

Now, as to spraying. I presume many here have had more experience than I. We have sprayed something like 7000 trees Mr. Underwood has, I think, more than 40,000. In our county we bought a car-load of gasoline engines. I think, with only one exception, we all used power sprayers. We bought a car-load of poison at one time, and the experiments followed in our county have been similar to those at the Agricultural College, under Professors Popenoe, Dickens and Eastman, backed up by bulletins received from Ohio, Illinois and New York state, as well as the United States Government bulletins. We had Prof. K. H. Bull, of Cornell, with us one day at Hutchinson, and it was unfortunate that all the fruit men in that section of the state could not have had a half hour at least with this able man. The experiments we carry on have been along the line of the bulletins received. We have used only liquid spray, of lead arsenate for the destruction of codling-moth, and Bordeaux for the destruction of scab and bitter rot. Most of the growers who have undertaken spraying there this year have followed practically the same line.

Our outfit costs very little. I took a new wagon, put on it a 225-gallon tank about seven feet long. I built over the rear axletree a place for my engine, which weighs about 750 pounds; around this engine we built a tower, with a floor, on which we stood.

If you will notice, in the early part of the growth of the petals all their ends stick up. We cover them better to spray down, rather than to spray up. Hence we stood upon this tower to spray. Most orchardists there have sprayed in the same way.

We sprayed once, before the leaves came out, with Bordeaux mixture, for the scab and bitter rot. I put the arsenate in with Bordeaux mixture for the first spray. I did it simply because the bulletins said to do that to make sure. When about eighty per cent. of the petals had fallen to the ground we began spraying the second time with arsenate of lead only, and used in the preparation five pounds of arsenate of lead to fifty gallons of water, and to each tank-load of about 200 gallons of water I added eight other gallons which contained the five pounds in mixture.

PHILLIP LUX: How did you mix it?

MR. NEWLIN: I built a crude scaffold, and on it arranged a couple of big water-tanks. Across the larger of these I arranged a small one, in which to slake my lime, running the slaked lime through very fine copper-wire screen in the end of this small tank to the large tank below. In this tank I kept my slaked lime in solution, 100 pounds of slaked lime to 100 gallons of water. On top of this crude scaffold and on the opposite side of the large water-tank from the lime tank, we have arranged eight or ten fifty-gallon barrels, in which to dissolve forty pounds of blue vitriol in forty gallons of water. This scaffold is about twelve feet high, and in front of this I have attached another about eight feet high, on which I have two 250-gallon casks, which I use in making Bordeaux mixture. Both were nearly filled with water; then to the one I added lime-water in solution from the lime

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tank above, and blue vitriol in solution from one of the barrels above to the other cask. I stirred the contents of each cask thoroughly, and simultaneously discharged contents of these two casks through two-inch hose to the tank on my wagon below, the two pieces of hose pouring their contents in a common stream into the strainer-box. In this way I had never failed to get a fine mixture of Bordeaux, and never had any trouble with nozzles clogging up. When using the lead arsenate at the same time as the Bordeaux, I added the proper number of gallons of lead arsenate in solution to the already loaded wagon of Bordeaux. The lime, the blue vitriol and the arsenate of lead were all dissolved, so that one gallon of the solution contained one pound of lime, or the blue vitriol, or the arsenate of lead, and thus every time I drew a gallon I used a pound.

The arsenate of lead was all I used for the destruction of the codling-moth. The Bordeaux I used for scab and bitter rot. We sprayed as soon as seventy-five per cent. of the petals had fallen, and again in about fifteen days, and then did not spray again, as we should have done perhaps, for thirty days. But in the future I shall spray every fifteen days, and keep it up through the season, if I have to spray eight or ten times. We spray 600 to 800 trees a day.

In 1903, in our county, we had a severe frost along about the last of April. We had no apples—absolutely none in our county. The next year we had a crop of apples and scarcely any worms, because, I suppose, there was nothing for these worms to feed on the year before (1903). I sold my entire crop to a Topeka man for seventy-five cents a bushel in the orchard. In 1905 I thought, until about the first of August, we were going to have a good crop; but the worms came, and in September we found practically all of the apples on the ground, and every apple had a worm in it. It was the same in all the orchards in the county. We began figuring and reading the bulletins, and began corresponding with Manhattan, and later with New York and Ohio, and simply bought machines and went to work. We took their word for it, and in our little orchard I am satisfied we have saved 5000 bushels of apples this year, on the basis of picking 10,000 bushels this fall.

As to the quality of the apples, we have been at a number of places this fall. We had a little fair down at Hutchinson—probably 25,000 or 30,000 people there for several days; also, down at Wichita; and our apples compared favorably with any we have seen yet. We have some in the hall here which we want you to look at before you go home. We are receiving very nice prices, on the average. We sold 1920 boxes of No. 2's the other day for eighty cents and seventy-five cents—Winesaps and Pippins.

WILLIAM BOOTH: How many times did you spray during the season?

MR. NEWLIN: Four times.

MR. BOOTH: Do you know about what it cost?

MR. NEWLIN: About three cents every time we sprayed a tree—four times cost about twelve cents. Under our Winesaps you can go along to six or eight trees and not get a basketful of apples from the ground, and the crop runs nearly seventy-five per cent. of fancies, or No. 1.

A MEMBER: What happened in your neighbor's orchard, that was not sprayed?

MR. NEWLIN: An orchard to the southwest was not sprayed, and had no

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apples this fall to sell. One of the largest growers in that county, a man whom some of you know, and who had apples at the World's Fair, didn't spray this year, and his crop is almost a complete failure. And that is the case in a good many orchards there.

EDWIN SNYDER: What did the engine and spray material cost?

MR. NEWLIN: The engine cost about $190, all rigged out with nozzles, hose, poles, and every equipment, ready to go into the orchard and do the work.

A MEMBER: Did you buy the tank?

MR. NEWLIN: No, we built our own tank and furnished our own wagons and rigged up our own machines.

A MEMBER: Didn't you get the load pretty heavy?

MR. NEWLIN: Yes, I did. That is the greatest fault. It takes two cracking good horses to pull it. If you have 1500- or 1600-pound horses they will move it along so slowly that you don't have to stop—can catch the tree as you pass by. There were two of us. One took the top of the tree and one the lower part, and we sprayed each tree thoroughly. Every tree, in my judgment, ought to be thoroughly wet. But the spray should not be put on thick enough, or so much of it, that it will run down; just a saturation, so that every particle of bark will have a little of this poison, is enough. If you put it on so thickly it commences to wash down the limb and runs off in drops. This, I think, will wash a good deal of the stuff off. It would be better just to saturate the tree.

A MEMBER: What is the horse-power of the engine?

MR. NEWLIN: One and three-fourths or two horse-power. A man can easily spray 500 to 800 trees per day.

PHILLIP LUX: Do you spray the whole tree?

MR. NEWLIN: No, sir. We go on one side of the row and then on the other. If the wind is from the south all day we spray from the south. Our trees are eleven, twelve and thirteen years old, with the exception of 100 trees which my father-in-law put out in 1875. I want to say that in 1904 and 1905 these tree were absolutely worthless on account of bitter rot and scab, and I thoroughly drenched these 100 old trees this year three times and they are as clear from bitter rot and scab as any trees in the county, and we got a good crop of apples from them. The apples were not as large as on our young trees. No one in our neighborhood has tried dust spraying, and no one will.

MR. SCOTT: I would like to ask whether the one spraying of the tree prevented the bitter rot in the apple?

MR. NEWLIN: The bulletins from the best authorities say that the spraying you give trees before the leaves come does the most good, because every particle of the bark can be saturated with Bordeaux, while if you wait until the leaves come it is a hard proposition to saturate the whole tree with any spray.

A MEMBER: Do you think it is necessary to spray as often as you say?

MR. NEWLIN: I sprayed my father-in-law's orchard four times and my own twice, and I got just about one-half the apples he did.

MR. SCOTT: Did you notice any rot on them?

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MR. NEWLIN: When Mr. Bull was there, along in the middle of July, I was spraying the orchard for the fourth time, and the sun was awful hot, and I was just about out of arsenate of lead, and could not get any more, and asked him the question, "Shall I go ahead and use Paris green?" He says, "I think so; but," he added, "you had better write the boys at Manhattan, and see what their experience is in the line of using Paris green under a hot sun in this locality." I got a letter in a few days from the boys at Manhattan, and they said, "Don't go ahead until you hear more about it." However, I sprayed probably all day long in the hot sun, from eleven o'clock to three. It was a mistake. It took some of the leaves off the trees and put a little rust on the apples, particularly Grimes' Golden. I can't tell you why; but it did.

MR. SCOTT: I always thought the most essential time to spray apples for the first time was just after the petals fell and not before the leaves came out.

MR. NEWLIN: Bulletin No. 247, from the government station, says that, in their judgment, the best time to spray for bitter rot and scab is before the leaves come.

MR. DIXON: Not a man in my county sprayed except myself, and they say I am crazy. But I find in picking apples this fall they were all wrong. Some men brought in apples that ran ten per cent. No. 1. Our apples run about seventy-five per cent. No. 1.

The report of the committee on credentials of delegates was received. (See membership rolls in front.)

PRESIDENT HOLSINGER: We are glad to welcome so many delegates. Inasmuch as the majority of this Society are life members it is very remarkable that we should have so many delegates, and we hope these delegates may become life members.

ELECTION OF OFFICERS.

The following officers were elected:

President, Edwin Taylor, Edwardsville.
Vice-president, Edwin Snyder, Oskaloosa.
Secretary, Walter Wellhouse, Topeka.
Treasurer, E. G. Hoover, Wichita.

Trustees were elected as follows:

Second district, C. V. Holsinger, Rosedale.
Fourth district, C. C. Cook, Eskridge.
Sixth district, J. J. Alexander, Norton.
Eighth district, Geo. A. Blair, Mulvane.

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COÖPERATION OR COMPETITION.

G. W. COLLINGS, Wichita.

In this paper I have thought it best to consider, briefly, some of the underlying and elementary principles of the business methods that apply, not only to horticulture, but to all classes of business as well. This is important, because if we do not correctly understand first principles all of our after-conclusions are apt to be wrong. I also note the fact that the subject for another paper on your program is "Coöperative Marketing," and I want to give the gentleman who has that subject a clear field, and have purposely avoided it.

A proper and full discussion of the subject of coöperation—combination—as against individual effort, necessarily involves a consideration of our social organization; the old question as to whether we are to regard the individual or the municipality (the state) as the unit of our social organization. I may as well say at the outset that, according to my way of thinking, organized society is the unit, and not its individual members. According to this idea, every individual member of society has an interest in the whole society—in its prosperity and success—that is paramount and superior to his own private interests.

It is society, organized as the state, that gives security to the person and value to the property of each of its members.

Gentlemen who own farms in this great state of Kansas, farms that are now worth more than $100 per acre, may not have stopped to consider that this value is not wholly the intrinsic value of the land, but that it has been very largely—indeed almost wholly—created by the social organization that surrounds it. For proof of this proposition you have but to recall the fact that not many years ago, when there was no social organization here, the same land, with exactly the same intrinsic value, was without purchasers at even $1.25 per acre.

Now I want to emphasize the point that whatever is beneficial to society as a whole, whatever goes to make up the sum total of the welfare and prosperity of the state, is alike beneficial to the individual members; and, conversely, whatever is harmful to society is also harmful to its individual members. And again, whatever is harmful to individual members is harmful to the state. The interest of one is identical with the interest of the other.

As a corrollary to the foregoing proposition, each individual member of society has an interest in the business success of all the members.

As an illustration of my contention, I want to call your attention to an extract from the writings of Bastiat, an eminent French writer and political economist. In "The Broken Window" he says:

"Have you ever witnessed the anger of the good shopkeeper, James B., when his careless son happened to break a pane of glass? If you have you will most assuredly bear witness to the fact that every one of the spectators offered the unfortunate owner this invariable consolation: 'It is an ill wind that blows nobody good. Everybody must live, and what would become of the glazier if panes of glass never were broken?' Now, this consolation contains an entire theory. Suppose it costs six francs to repair the damage, and you say that the accident brings six francs to the glazier's trade; that it encourages trade to the amount of six francs—all this is that which is seen. But if you come to the conclusion that it is a good thing to break windows, that it causes money to circulate, and that it encourages industry

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in general, your theory is confined to that which is seen; it takes no account of that which is not seen.

"It is not seen that as the shoopkeeper has spent six francs on *one* thing he cannot spend them on another. It is not seen that if he had not had a window to replace he would perhaps have replaced his old shoes, or added another book to his library. In short, he would have employed his six francs in some way which this accident has prevented.

"Let us take a view of industry in general as affected by this circumstance. The window being broken, the glazier's trade is encouraged to the amount of six francs. This is that which is seen. If the window had not been broken, the shoemaker's trade (or some other) would have been encouraged to the amount of six francs. This is that which is not seen.

"Now, if that which is not seen is taken into consideration as well as that which is seen, it will be shown that neither industry in general, nor the sum total of labor, is affected, whether windows are broken or not.

"Now, let us consider James B. himself. In the supposition of the window being broken, he spends six francs and has neither more nor less than he had before—the enjoyment of a window. But suppose the window had not been broken, he would have spent the six francs in shoes, and would have had at the same time the enjoyment of a pair of shoes and a window; whence we arrive at this conclusion: Society loses the value of things which are uselessly destroyed, and we must assent to the maxim that to break, to spoil, to waste, is not to encourage industry—or, more briefly, destruction is not profit."

We are now led to this proposition: When the members of society are engaged in a business war, one seeking to succeed by the ruin of others, the whole society must suffer. And this is exactly what takes place under the competitive method of business. What is competition?

COMPETITION.

Our present social organization is modeled on the plan of competition. Our laws recognize competition, and our business is, or has been, all done on the competitive plan. Competition enters into all our social affairs. Competition is the measure of our civilization. Competition is, or has been, so a part of us that we have crystallized the trite and terse maxim, "Competition if the life of trade."

There may have been a time in the progress and development of society when competition was a good thing. Our business methods were different then from what they are now. Many of you will remember a time when each family produced nearly all the necessaries of life. You can remember when every farmer raised the sheep that produced the wool that was carded and spun and made into the clothing for the family at home; when every farmer raised the flax from which the family linen, as well as the thread used in making the clothing, was all made at home. But now we have grown beyond all this, and now our business methods are entirely different. We have learned that better results can be attained by specializing, and a great deal of the work that was formerly done slowly and laboriously by hand is now turned out rapidly and much cheaper by machinery. The maxims and methods that suited the old order of things are no longer applicable or appropriate.

And now I want to challenge the correctness of the old maxim that competition is the life of trade. I maintain that, instead of competition being the life of trade, it is just the opposite—it is the death of trade. Competition is the internecine war of society. It is fitly typified by the struggle for existence in the animal kingdom, and its appropriate symbols are the beak,

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and fang, and claw. In human society it is the success of the few by the destruction of the many. Its appropriate formula is "One millionaire and a million of paupers."

When General Sherman said "War is hell!" he expressed a self-evident truth; but competition in business is no less hellish than the war that is waged with shot and shell.

A few years ago I occupied a "blind" on a small island in the Ninnescah river. I had gone to have my "annual" in pursuit of the wild fowl. I had made great preparations for this outing, and had the brightest hopes and most rose-tinted anticipations of the pleasures and success of the hunt. For months previous to my going I had worked early and late so that I could feel that I could spare the time to take a week out of the office when the geese and ducks should be due on their semiannual migration. The necessary accoutrements had cost me much time and care and experience in selecting, as well as some "intrinsic" value. It had required no little practice to acquire the skill to stop one of those birds as it would "scoot" by at the rate of 100 miles an hour. Then there was the time and skill and patience that it took to train a dog to swim the river through the ice to retrieve the dead and crippled birds. The trip out had been unusually hard on account of snow-drifts encountered; the river ran full of ice; the weather was cold; the wind raw and piercing as no other than a Kansas wind can be. This was all right enough, for be it known that the best wild-fowl shooting can only be had in the roughest weather. It has been truly said that the person who pursues the wild fowl with success is no Sybarite. Camp was made—blinds arranged with great labor and care. There was plenty of game on the wing, and everything seemed to indicate a successful hunt. At last my day-dreams of a whole year were to be realized; but as soon as my blind was occupied I found to my utter dismay and disgust that I had competition.

So interwoven into our whole social fabric is competition that it is impossible to escape it even in our sports and amusements. A few hundred yards below me three shooters stationed themselves and fired shot after shot at every bird that appeared in the horizon. Up and down the river, at every point and at every place, walked, skulked or hid some shooter. They did not get any game themselves nor did they allow any one else to get any. Shots were continually being fired when the person firing could have no possible hope of getting anything—fired with the sole view, apparently, of preventing some one else from bagging the game. And thus all the hopes of a year were blasted and withered.

But this is competition! It is exactly like competition in business. Exactly the same difficulties and disappointments of the duck hunt are taking place every day in business. Look around you and you cannot fail to see the drama being acted over and over again in your own business and in the business of your neighbors, every day in the year. Many and many an one has spent his time in preparation for some business enterprise, invested the earnings of a lifetime, the support of self and family, saved by the hardest toil and laid away to "keep the wolf from the door" in his old age. Education, experience, money, his whole life, are invested, only to find all points both below and above him on the stream of life occupied by persons in quest of the same game that he seeks, firing their Zulus and blunderbusses at everything that appears in sight. It matters not how well he may

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be prepared to do the business. His education, and experience, and outlay, all count for nothing. The opportunity of a lifetime has been blasted. The fondest anticipations and brightest hopes are withered, and in many cases the victim of this vicious system goes down to a pauper's grave through penury and want.

Such is competition! and such is the foundation of our boasted civilization! Yes, we boast of our accomplishments and our learning, and we fashion our social organization and business methods after the methods furnished by the vulture and the harpie, and the coyote and the hyena!

That condition of society is best in which every member is engaged in some useful occupation—in which every one does his equal share to provide for the general welfare of the whole.. It is not enough that every one is employed; the occupation must be a useful one and the labor must be crowned with success. Those who do not thus contribute their share to the common fund are being supported by the community. *They are parasites! They are paupers!*

A man may be just as much a pauper who is reputed to be worth his millions as the "wandering Willie" who calls at your kitchen door for a "hand-out." In the last analysis, the question of a person being a pauper is not determined by what he *owns*, but by what he *does*. Is he engaged in some useful occupation, so that he contributes his share to the general fund? If not, he is a parasite and a pauper, whether called a hobo, a real-estate fakir, a capitalist, a speculator, or the president of a life-insurance company at a salary of $150,000 a year.

"Toiling hands alone are builders
Of a nation's wealth and fame;
Titled laziness is pensioned,
Fed, and fattened on the same."

Persons engaged in competition must fight each other. A great part of their work is not useful. It is the work of destruction. It is wasted energy and a loss to society. Persons thus competing are spending their time and money to break down each other's business. They are breaking each other's windows—destroying the property of others and preventing them from contributing their share to the general fund of society—making paupers that have to be supported by society.

The number of business failures, the number of lives shipwrecked, the number of persons for whose declining years there is no other support than that of charity—all, in one way or another, the result of competition—is appalling. Did you ever stop to think what it means to have a social organization—a business system—that gives 90 per cent. of the wealth of the country to 10 per cent. of the people, and to 90 per cent. of the people only 10 per cent. of the wealth?

I once lived in a town with a single railroad, and the incessant cry of the citizens was for another road. In their guileless innocence they thought that with two roads they would have competition, and that would be a sovereign remedy and sure panacea for all their railroad grievances. Did you ever stop to think what would be the result of having two railroads connecting two given points where one could do the business? Let us see! Double the cost of construction; double the cost of equipment; double the cost of operating. And who pays this double cost? The patrons of the road, of

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course. Here is competition, and one of two things must happen—either the patrons of the road must pay twice as much as they ought to pay, or one or the other, or both, roads must go into bankruptcy.

What is the result of having two telephone companies in the same town? Competition? Yes. As in the case of the railroads, double cost of construction, of equipment, and of operating. But, unfortunately in the case of the telephone, the double does not stop here. The person who wants telephone communication must put in two 'phones and pay each company double, or four times as much as the service should cost him.

It is now "quite the thing" to denounce the trusts. Each political party seems to be trying to outdo the other in this denunciation. But, when all is said, the fact remains that the trusts have discovered and adopted correct business methods. They have learned what the old gentleman with the bundle of sticks sought to teach his boys—that in union there is strength; in separation, weakness. They have ceased to spend their energies and means in warring with each other. Instead, they employ these in the prosecution of business and divide the profits. This is a plain, common-sense business proposition, and the wonder is that it has not been recognized and put in practice long ago. It is the natural law of trade, and attempts to check it by legislation will be either ineffective or harmful to the people who expect relief from such laws.

When I have said this I do not want to be understood as advocating a condition of things which will favor the acquisition of fabulous fortunes—swollen fortunes, President Roosevelt calls them—by a few people and leaving a great number of other people without the comforts of life that of right belong to them. I am simply insisting that the cooperative method cheapens production, eliminates useless expenses, stops waste, and thus adds to the general wealth of the community. But remember, the production of wealth is one thing; the proper distribution of it among the people is quite another thing.

If you desire a proper and an equitable distribution of the wealth among the citizens of the state you will have to seek some other means than that of fighting and legislating against coöperative effort. You will have to adopt some other tactics than the Bryan-Roosevelt plan of government control of monopolies. Government control of monopolies, and income taxes, and inheritance taxes, all catch the ear of the people; but they will not "deliver the goods." In the language of the lamented Senator Ingalls, they are "iridescent dreams." They are all based on the idea that you are first going to allow these monopolies and swollen fortunes to grow, gain their strength, put on their boots and spurs, and then control or rob them afterwards. It is like an army going out to fight, and first going and helping the enemy to build its fortifications, dig its trenches and put itself in an impregnable position, and then engage it in battle. The deadly upas tree of concentrated wealth that is poisoning the business and the morals of this country is not going to be destroyed by pruning a few insignificant branches from its top. You horticulturalists know that the way to kill a tree is to girdle it at the ground—strike it at the root. The only way that the government will ever control monopolies *is to not have monopolies to control.* And the only way to not have them is to so modify the social organization, the government, that monopolies will not be produced.

You will have to seek your remedy in an abolition of the private owner-

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ship of the things that nature provides for all the people alike, and in which every single human being has a natural and an inherent equal right with every other human being. That great power that created the universe never deeded in fee any part of His creation to any one, "To him and his heirs, to have and to hold forever." That was the invention of the tyrant as a means of robbing his fellows of their natural inheritance. Think for a moment how many "swollen fortunes" and monopolies would be retired if there was no private ownership of the gold-mines, the silver-mines, the iron, the lead, the zinc, the copper, the coal, the oil, the gas; all provided, not by the labor or the invention of man, but by the bountiful hand of nature, for all human beings in common. Think how many gamblers in mining stocks —parasites on the body politic, every one—would have to seek some other employment. And these are but a few of the things that would result.

The abolition of private ownership in the things that nature provides is but one of the things that must be done, but is the one of the greatest importance.

But there are others. The one next in importance is an abolition of our present system of providing the revenues for the government—a system derived from the robber—unjust, unscientific, the most expensive that could be devised, and in every way unsuited to a civilized people.

That the coöperative method results in a great saving over the method of competition may be quite clearly shown by an example. Take the type-founders. When you read a paper or a book you little think of the labor and skill that it has taken to make the type from which it is printed. In a font of type there are more than a hundred characters, each a separate piece of metal. To make these each character is first engraved on the end of a piece of steel. In some of the smaller sizes these bits of steel are scarcely larger than a common needle. All these characters must be made in exactly the same style, same shape, same size, and so all parts of every one will exactly line with every other one at both top and bottom. To do this requires the greatest skill, and the artisan who does the work must be paid the highest price.

When this engraving is done these pieces are driven but slightly into pieces of copper, each one to exactly the same depth. These pieces of copper are now the matrices, the molds in which the faces of the type are cast. Now this work is all for one font of type, of one size and one style. But going from the smallest to the largest there are a great many fonts, each requiring the same work to create. Then, too, the different styles of type are as various as the different styles of the Easter hat, and the users of type are as capricious as the users of spring millinery; so that hundreds of styles and hundreds of sizes must be made. Under the competitive method each one of the numerous type-foundries in the United States must keep a corps of these skilled workmen engaged all the time, as each foundry had to make its own matrices. The outlay was simply enormous.

Some years ago most of the type-founders in the United States made a combination—a trust—and now the matrices that are made at any one foundry of this trust are available for the use of all, and need not be duplicated. By reason of this combination type can now be made at a cost which probably does not exceed one-half the cost under the competitive method.

The viciousness of the whole thing is that the people who use the type,

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the readers of papers and books, do not receive any of this benefit. The type-founders themselves "swipe it," and it goes to swell the profits of the business (and sometimes to swell the prophets who belong to the trust).

The thing then for us to do is not to fight the trust method—because it is the correct one—but to apply ourselves to a solution of the question as to how to so modify our social organization that the whole people will share in the benefits arising from this improved method. That this can be done there should be no doubt. That it will be done is equally certain.

ORGANIZATION OF WATHENA FRUIT GROWERS' ASSOCIATION.

GEO. W. KINKEAD, Secretary.

I understand from the secretary that I was to give a history of the working conditions of our association. So I am a little off of my subject to-day. I did not know better until a few hours before I started out.

Before discussing the subject of my paper, it might be well to make clear to some of my hearers just where the body of fruit growers that I represent is located. Our shipping station, Wathena, is just west of St. Joseph, at the foot of the river bluffs, on the Chicago, Rock Island & Pacific and Grand Island railroads. These roads furnish us ample shipping facilities, as they give us access to the wealthy agricultural and grazing districts of the West, Northwest and Southwest—districts where little fruit is grown.

The soil about Wathena seems naturally very rich in the proper elements for producing highly colored fruit of excellent quality, and especially is this true of the small fruits and grapes. We believe it is essential for the fruit grower to be suitably located as to good transportation. We believe that it is well to be versed in and conversant with all the diseases and enemies that may attack his orchards and fruits of various kinds. We believe that it is well he should understand something of the mysteries of soil elements, their digestion and assimilation by plant life, but I ask of this intelligent audience if it is not well and important that the grower should understand how to inspect and properly pack his own fruit? and is it not of vital importance that he be familiar with the best markets, that he may have a just compensation for his fruits? These last clauses are the basis upon which the Wathena Fruit Growers' Association was organized. For instance, a better pack, higher grade fruit, and better returns. After some deliberation, on February 28, 1905, twelve growers, of which I am pleased to say I was one, adopted a set of by-laws and applied to the secretary of state for a charter to organize a corporation known as the Wathena Fruit Growers' Association.

In due time the organization was completed. One provision in our by-laws is that all fruit must be subject to a uniform pack, a rigid and impartial inspection, and properly stamped. Another is, that each fruit grower, on becoming a member, must pay into the treasury of the association the sum of $10 cash; also, he must file with the board of directors a bankable note of $100, such note to be held by the board of directors as a pledge of good faith on the part of the giver.

The fruit-shipping at Wathena, prior to our organization, was in the hands of five or six firms known as buyers or shippers. These firms sold the grower his crate material, baskets, etc., upon which they made a good profit. They paid him a platform price for his fruit, upon which they made a good

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profit. The growers did not object to this profit so much as to the tendency of the shipper to decline the market on the least evidence of a threatened oversupply.

Notwithstanding a hard struggle, having met our enemy in open and in ambush, we lived through the season of 1905, handled the fruit of about thirty growers, and at the close of the year declared a dividend of four per cent. above all expenses. The spring of 1906 we increased our capital stock and raised our membership to 100 strong, taking in the best growers in the community.

We have handled during the present year 33,000 cases of berries, 23 car-loads of grapes, 6 car-loads of peaches, and 56 car-loads of apples, making a net profit on the year's business of $5000. The association has no liabilities. In this net profit the fact is not considered that all berries were held from 25 to 40 cents per case above the price of former years. For instance, when blackberries were selling on the market at St. Joseph for 90 cents per case, on the same day we receipted to our growers $1.25 per case, met our expenses, and made a net profit above this figure. Few of our grapes sold under 18 cents per basket. Our peaches found ready market in Minnesota, Dakota and Colorado points.

I wish to say here that most of our berries are sent out by express. We have made car-load shipments, but the most of them have been by express. Nearly all of our grapes were, of course, sent under refrigeration, in car-loads; peaches likewise. We have had excellent success in collecting claims for damages against the railroad and express companies. To illustrate, we had one car of peaches loaded in eight-pound grape baskets. They were Elbertas; about the finest I ever saw. They were so large that some of the baskets had not more than fourteen peaches, put in two layers. We sold this car-load of peaches to a firm in Denver, but through some error the railroad company neglected to ice the car, and they arrived at destination hot, and the consignee turned them down. We made claim to the railroad company for the difference between the price for which we sold them and the price agreed upon, and a few days ago we got a check for the full amount from the railroad company. As I said before, the express companies and railroad companies have treated us very kindly.

The business of our association is carried on entirely by its own members, men who are actually engaged in fruit growing.

Each kind of fruit bears its own expenses, its own losses, its own gains. That is, if we sold 10,000 cases of strawberries for $15,000 and made a profit of $1000 above expenses, we would declare a dividend of six and two-thirds per cent.

While we are young as an association and realize we have much to learn, we are much gratified by our success. We ask your hearty cooperation in an earnest endeavor for a good cause.

PHILLIP LUX: How do you manage the members who bring in inferior fruit?

MR. KINKEAD: It is evidently understood by our members that their fruit will be rigidly inspected. We employ inspectors to look after this. When a man brings in poor, unmarketable fruit, upon which we cannot put our stamp of inspection, we turn it down; and no grower is going to have his fruit turned down many times. After the fruit is turned down, St. Joseph, a market four miles away, is sought for it.

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MR. DIXON: I want the gentleman's receipt for dealing with the railroads; for getting returns so quickly for cars arriving in the condition he said they did. I have some claims like that, and it has been quite a while since I put in such claims and I have never heard from them. It generally takes about two years for them to get around.

MR. KINKEAD: As I said, our association is young, and we have been very fortunate in collecting accounts. Mr. Martin, our business manager, is here. He may inform you.

MR. DIXON: Are you troubled with overcharges? Nearly every car we ship has an overcharge of from ten to forty dollars, which takes time to adjust.

MR. KINKEAD: I don't believe we have had a case of that kind.

PHILLIP LUX: Mr. Dixon, did you ship as an association, or as an individual?

MR. DIXON: As an individual. Of the nine cars of peaches I shipped, there was an overcharge of freight on almost every car. You know the minimum is 20,000 pounds. One car we had held no more than 18,000 pounds of fruit.

COÖPERATIVE MARKETING.

By R. W. RADER, Secretary Arkansas Fruit Growers' Association, Fayetteville, Ark.

My paper follows a good deal on the line of Mr. Kinkead's. It is merely a history of our association. The principal business is in regard to shipping berries, the shipping of apples, and such as that.

In behalf of my fellow citizens and brother horticulturists I bring you friendly greeting from a most distinguished apple- and berry-growing section of the Middle states, the northwest corner of Arkansas.

There are many reasons why these Ozark mountaineers are proud of their rapidly developing fruit industries, and they look to the future with great confidence and satisfaction. The two corner counties along the west border, Washington and Benton, claim the distinction of containing by far more apple trees than any other like area in the world. These two counties in 1900 boasted of having over three millions of apple trees, and it is estimated to have increased to nearly four and one-half millions up to now. In 1901 the total output brought the growers the handsome sum of $4,000,000 for the green and evaporated fruit. It is well and credibly said of these two counties, then, that to them belong a large share of the honor and glory, associated with the more substantial evidences, in the story of the "Land of the Big Red Apple."

When we speak of the Ozark mountains, which are shared alike by Arkansas and Missouri, do not allow the thought of mountains to lead you to think of high, barren, inaccessible peaks, valued only as beautiful scenery, but rather of rolling timbered elevations, easy of approach, affording a foothold for the farmer, with the greatest natural orchard and fruit-growing soil, beneath a climate that seems especially to favor the production of apples, peaches and strawberries, and furnishing building sites for really beautiful homes.

It is the purpose of this paper to discuss the advantages of coöperation in the marketing of fruit products, or perhaps I should say ways and means

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of marketing it, for I consider that there is not a shadow of a doubt but that the idea of coöperation in one form or another is the best solution yet advanced of the problem of commercial fruit growing.

The growing of apples and small fruits in north Arkansas is as old as the history of the state, but the epoch of this paper dates back only a few years, beginning shortly after the advent of the 'Frisco railroad, which was the landmark of success to the commercial growers.

To Mr. A. L. Stearns belongs the credit of introducing the growing of strawberries for market in Washington county, about 1890 or 1892. By comparing the soil about Fayetteville with that of his former home in Michigan, where berry growing was successful, he decided to try it, and subsequent results proved that he had discovered something of great value to the country. Closely following him was Mr. B. A. Rudolph, who was later associated with H. A. Davis and J. C. Williams in the Fayetteville Berry and Plant Company. This firm at one time cultivated 300 acres in strawberries and blackberries.

It was when berry growing assumed such proportions as this that the producers began the organization of shipping associations along the line of the railroad. This organizing movement began about 1895 or 1896 and to-day there are in the Ozark region over sixty in operation.

These associations are chartered and incorporated under the laws of the state. The general nature of the business proposed to be transacted by these corporations is to provide for the mutual coöperation in growing and shipping fruit and vegetables and for the protection of its members as such growers and shippers, and to procure the best transportation facilities, generous freight and commission rates, and secure the highest price in market for the sale of their products.

These associations are officered by a president, vice-president, secretary, treasurer, general manager, and a board of directors, who are elected by ballot annually. The active management of the affairs of the association is in the hands of the general manager, who is always a man of much experience both in business matters and as a grower. The general plan of the season's work is formulated by the board of directors, who, with the president and secretary, are the business committee of the association. The buying of crate material is sometimes managed by the association, and at other times some member will handle the material on a small commission basis, the growers taking it in the knock-down generally and making up the crates during the winter days.

Any grower of one or more acres of berries may become a member by purchasing a share of stock, which entitles him to one vote at meetings of the association when questions of mutual interest are being considered. Some restrictions are placed on members; for instance, they are not allowed to haul their fruit more than three miles, and are required to handle it on springs or in frames made specially for the purpose. All members are notified when the association will begin to ship in car lots, and they are required to deliver all their stock to the association during that period.

Suitable packing sheds are located at convenient places in the berry-fields, which are headquarters for each grower's help during picking hours. The pickers are each supplied with a six-quart carrier, and are managed in the field by a foreman or row boss, who has complete charge of the field work and directs the pickers where to work and how to do it, giving such

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instructions as are necessary to insure a perfect pack. The shed is provided with a good, solid table, where the crates are filled from the carriers and nailed up properly to allow of inspection at the association loading shed. As soon as a load has accumulated at the shed they are loaded into a frame that is supported by five or six pairs of wagon-seat springs, and after being covered by a canvas to protect them from the sun and dirt they are hauled to a shed provided by the association at the loading switch; here they are placed upon the platform and inspected by a competent man furnished by the association. The grower is receipted in duplicate for the number of crates that pass inspection, after which time the association is responsible for the stock.

This duplicate receipt is kept by the secretary and from it the manifest for each car is made. This manifest consists of a complete list of the members, and the number of crates delivered in the car is entered opposite each member's name. A copy of this manifest is tacked on the inside of the car, another is sent to the bank through which remittance is made, and still another is kept in the office. At the top of manifest is found a record of the total number of crates in the car, the date shipped, to whom shipped, the destination, routing, and the price at which sold. This makes a complete record of each car, and from it a record of the season's business can easily be made.

All of the berries that are picked any one day are delivered the same day at the loading shed and placed in refrigeration as soon as possible. We are more particular about this as the season advances and the fruit is in prime ripe condition. Every precaution is taken to expose the fruit as little as possible after it is taken from the vines.

The acreage represented by the different associations varies from 100 to 1000 acres, several in Washington county being as large as the latter figure, and when you consider that on the average five pickers are required to the acre, you will at once see what an army of pickers flood this berry section every year. The different associations send out circulars advertising for the number of pickers wanted and as near as possible when the crop will be ready to pick, and lo, when that time arrives, the "berry glommer" may be seen coming from the east and from the west by every mode of transportation, but principally after the style known in early Kansas history as "prairie schooner."

It is necessary for the large growers to furnish temporary shelter for their crew, also water, fuel, and pasture for the stock.

These associations are really self-supporting, consequently they are no hardship on the grower. When our growers consign local shipments to commission houses, it is customary for the house to deduct ten per cent. for handling; when the association consigns, the same commission is charged against the grower, but by special contract on the part of the association, on account of shipping in car-lots, the commission firms rebate the association three per cent. of the ten per cent., which has always created sufficient funds to defray the expenses of the season. For instance, suppose a car of 576 crates sells for $2 per crate; the gross receipts would amount to $1152; of this amount ninety per cent. is sent to the bank for the credit of growers, seven per cent. is retained by the firm, and the three per cent., which amounts to $34.56, is refunded to the association. When cars are sold on track, the association generally retains only two per cent. of the net returns.

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If this rebate and discount of track sales leaves a considerable balance in the treasury after the expenses are paid, it is prorated back to the growers, giving them every advantage of economy in management. It is generally considered that this is handling fruit as cheaply as can be expected, and in addition it is handled with much more care than when shipped locally in small lots. Growers cannot afford to be without the protection and mutual benefit of such organizations as this, taking his own risks against that of combined experience.

The most progressive step that has been made lately was the organization two years ago of the Ozark Fruit Growers' Association, which is a father organization of nearly all the local associations in western Arkansas and Missouri. So thorough are its methods that I feel confident that if it had not been in existence during the season of 1906 our growers would have suffered exceedingly bad reverses. Selling agents in the markets and shipping agents in the field are kept in touch by wire daily just how much fruit can be shipped and at what figure it can be disposed of. Not only do they keep posted on prices, but also on the condition of the market otherwise. Suppose that after a car has been sent out it is reported by the selling agent that the market to which it has been shipped is found to be glutted; the car on its way is diverted and sent to another point where a supply is needed. In this way the crop receives the very widest distribution possible, which is now a factor of the greatest importance. During the past season the Ozark Fruit Growers' Association demonstrated its ability along this line when the work was at its best; the four days showing the heaviest movement from Arkansas, 165 cars were handled by them, and over 90 cars more by independent shippers, making a total of 250 cars in four days. Without a thorough system of distribution the successful handling of such a quantity of fruit in so limited a time would be little short of a miracle, unless it could be called a lucky guess. Let every fruit grower give such organizations their loyal support and help them make their victory a complete success.

It is the part of the grower to produce fruit, and I know you will all agree with me that there will probably never be produced too much "A1" stock, and that it is never the best fruit that gluts the market; so let us urge the necessity of packing none but the best. Competition is growing more fierce every year, and we are certainly approaching very near, if we have not already reached, the point where quality is the key of success. With berries of first quality and carefully packed we need fear no unprofitable results. In the near future I believe canning and preserving factories will be profitably installed to take care of the stock that will not pass inspection as "A1," and to use the entire crop as the season advances and it is not advisable to continue shipping.

The fruit industry in all its branches is making increased use of the very best methods; and let us make our reputation in keeping with our good intentions, to be known in the world's markets for the finest products of the field and orchard.

QUERY: *Will coöperative neighborhood cold storage pay?*

COLONEL ROBISON: That is a business in which I am not profoundly learned. We have a cold storage in El Dorado, built last year. It has been used to good advantage by the farmers. Many farmers put their apples in

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for preservation, and they are doing quite well. Fruit growers, of course, will always need much instruction as to how to prepare their apples for cold storage—to sort them, and not sort them too closely. It is profitable to handle more than one grade. For general use there are always some people who buy high-priced fruit of good quality, and then again there are some people who want a lower quality. They are all good; some are better than others. We find that two grades pay better than putting all in one grade. Apple packers know it is very little trouble to run the apples into two barrels at one sorting. It will not pay for farmers to build an expensive cold-storage plant, but I do believe that they can be built in many of the smaller towns for all cold-storage purposes, and be made very profitable. As I said, I have n't had a great deal of experience in this line. Cold storage can be made to average cheaply if you can utilize it in quantity. It is one of those things that needs to be kept full to produce it cheaply.

QUERY: *Would not an annual instead of a biennial report be more useful, profitable, and acceptable?*

EDWIN TAYLOR: Mr. President, I really don't know what answer ought to be made to that. The State Board of Agriculture makes biennial reports and they have gotten along pretty well. I don't know why a biennial report should not do us, if it could be supplemented with the occasional report that it sometimes makes, and that we sometimes make on some features of our business. I don't know whether the legislature would stand for our printing the report annually.

SECRETARY BARNES: The Board of Agriculture gets out a quarterly, and that keeps people posted. They make their biennial up from the quarterlies; in horticulture we have a great many insects to fight, and if we have to wait two years to get the information before the people, the increase of insects is so great that the expense would be very small compared with the depredations caused. When our report was made a biennial, so was also the report of the labor commissioner, and one or two others, and I think they have all been put back to annuals but ours. I know that the labor commissioner asked for and got an annual report. I asked them why they did not "let us in on the ground floor?" but it seems they thought they could go it better alone.

QUERY: *How can we improve the quality of our commercial varieties of fruit?*

GEO. A. BLAIR: I understand the question is regarding the improvement of the fruit we are now growing. A perfect fruit should be one uniform in size, color and flavor. The necessary things to create that, would, in my opinion, be a healthy tree, well fed, judiciously pruned, and properly protected from fungoid and insect depredations. I can say, then, the method would be careful pruning, good cultivation and liberal feeding of the tree, after which protection by spraying would be next in importance.

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SOME PROFITABLE NUT-BEARING TREES.

By JOHN N. MACOMB, Lawrence.

The importance of the cultivation of nut-bearing trees depends upon the profit of their fruit and also upon the value of their timber. Many valuable nut-bearing trees are indigenous to Kansas. There are others that might be cultivated here without difficulty if they were given such care as our best orchards receive. Most of the nut-trees are very difficult to transplant, and the seed must be planted in the places where the trees are to grow. This takes a long time, and as "time is money" it must be considered with reference to profit.

The profit, like that of all other crops, depends upon the market. The market depends upon the supply and demand. The demand depends upon the taste of the people, and the latter sometimes depends upon the caprice of fashion and sometimes upon supply. At present the supply is limited and the price is high. As a larger supply appears upon the market, the price will become more reasonable and nuts will become a more common article of food.

Nuts as an article of diet are not only agreeable to the taste, but they are highly nutritious, some varieties containing from fifty to sixty per cent. of the fatty material of food—consisting largely of carbohydrates.

I mention the chestnut first because it is a general favorite and because I think it has more of the elements of success than any other nut for this locality. In Spain and Italy the chestnut forms a large part of the food of the peasant. The large chestnuts of those countries have been famous the world over from a very early day. The fruit is eaten either raw, boiled, or roasted, or is ground into meal and puddings, cakes and bread made from it.

The Japanese have given us some valuable chestnuts. They require grafting, however, which is rather uncertain.

There is a weevil that is a troublesome enemy to the chestnut.

The chestnut, if planted upon a rather light but rich soil and properly cared for, should grow into a bearing tree in from eight to ten years. Under favorable conditions the tree should last a long time. It is said that a chestnut tree in England is now standing that was known as a boundary tree in the reign of King John. A famous chestnut tree is growing upon Mount Etna, in Sicily, that is said to be 160 feet in circumference. The lumber is valuable for inside finish, and it also makes a very durable post. The roof of Westminster Abbey, in London, and of the church of Great Yarmouth, erected in the reign of William Rufus, are said to have been made of chestnut.

The Madeira-nut (often improperly called the English walnut) is a great favorite and will always command a high price. It is raised successfully in the Eastern states, farther north than Kansas. It should do well here.

The pecan is indigenous to Kansas. The best pecans are raised upon the Gulf coast, where great attention is being paid to their culture upon a large scale, and already wonderful results have been obtained. But our own native pecan yields well and the crop brings a remunerative price. They should be planted in groves as they seem to bear better thus than when growing singly.

The coarser nuts, such as the Black walnut and the butternut, are also valuable, not only on account of the quality of the nuts, but also on account of the lumber. They are both comparatively rapid growers.

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The filbert grows on a tree or bush too small to be of value for timber, but it matures early and the nut brings a good price.

At present there is an import duty of four cents per pound upon several of the varieties of nuts that I have mentioned. It is quite possible that this duty could be continued if Congress were cultivated as well as the nuts.

Every farm needs shade-trees for the benefit of live stock in the pasture. Timber belts are very important and if generally cultivated would have a beneficial effect upon the climate.

I would not recommend the planting of nut-trees in Kansas commercially as we plant apple orchards, but I think every farmer would do well to select such varieties as seem best adapted to his soil and situation and plant them for shade, or screens, or for windbreaks, taking care of them as he would of the trees in a fine apple orchard, and in the course of a few years his farm will be more valuable, and, what is better, a pleasanter home.

Evening Session.

DIETETIC VALUE OF FRUITS.

By Henrietta W. Calvin, Manhattan.

Every housewife has dreamed of the time when there would be no more soiled dishes to wash, no more pots and pans to scour, no more bread-boards and rolling-pins to cleanse, and when she has read of the possibilities of a "nut-and-fruit diet" she has thought that the time of her liberation was approaching. She has pictured to herself the family sitting out upon the lawn consuming a meal of nuts, dates, apples and oranges, a few leavings to be carried away and buried or hidden, with no after cleaning to be done. But, alas, for her dreams and her pictures! The physiologist and chemist assure her that a definite proportion of proteid material is necessary; that such proteid material cannot be advantageously derived from the vegetable kingdom, and that, so long as the human being remains what he now is, animal food and cooked food will be essential to his welfare.

Assuming that we shall continue to consume meat and cooked foods, let us consider to what extent fruits should enter into the dietary. Fruits contain pure water, organic acids, food material in the form of sugar, and occasionally starch, mineral salts, and cellulose.

The water contained in fruit is aseptic, in every way, of the best quality, so that fruits become valuable as quenchers of thirst. But they are most valuable because of the organic acids which they contain. These acids (citric acid in lemons and oranges, malic acid in apples and peaches, and tartaric acid in grapes) break down in the digestion and form, with the alkaline salts present in the digestive tract, alkaline carbonates. These alkaline carbonates are absorbed and increase the alkalinity of the blood. The blood is normally alkaline, but when meat is used to excess uric acid appears, the blood becomes acid, and mineral salts normally held in solution are thrown out of solution and deposited in the tissues, causing rheumatic difficulties, gout, etc. The fruit acids, rendering the blood alkaline, combat this difficulty, hold in solution the waste materials, and aid in the removal of such waste from the system. So fruits become both preventatives of

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rheumatic and kindred difficulties and cures for these difficulties in their earlier stages.

There are "grape cures," "orange cures," "lemon cures," "cider cures," and "apple cures," all of which do cure, for the reasons previously given, together with the additional reason that they supply to the body a large volume of pure water, which is rarely consumed in the quantity that it should be.

Few of the fruits are important because of their food value; that is, the sugar and starch they contain, because sugar and starch are easily obtained from other sources. Yet bananas, figs, dates and grapes all contain enough carbohydrate to be of some importance, because of the possible energy they would produce. A quart of grape juice yields to the body as much heat and work-power as a quart of milk, though, of course, this potential energy is in a different form.

All have been accustomed in childhood to receive molasses and cream of tartar as a spring medicine. Grape juice contains cream of tartar in a much more agreeable form, and no better medicine can be taken in the springtime than liberal quantities of unfermented grape juice.

While cellulose of fruits is not completely digested, it is very valuable as bulk; for the human being, like the lower animals, requires a certain amount of bulk refuse in order to have digestion proceed at its best. The waste material of fruit increases peristalsis, thus preventing some of the commonest digestive difficulties.

If properly prepared, fruit rarely fails to agree even with those of weak digestion. Of course fruit must be ripe, but not overripe. If underripe it will contain acrid indigestible material, as is evidenced by "the small boy and green apple." If overripe it will have many foreign bacteria on it and in it, and these will set up an active fermentation within the body, causing digestive difficulties. Acute indigestion frequently arises from the use of the overripe shipped blackberries that come into our region early in the summer. Not that there is anything harmful in the blackberries, but because of the malfermentations that have taken place in the crushed and bruised berries.

Apples, the best of our native fruits, are more easily digested cooked than raw, though raw ripe apples, thoroughly masticated, seldom fail to agree with any ordinary individual. In the majority of cases, when people complain of an inability to digest apples, it will be discovered that they either have not teeth to masticate well or have not formed the habit of proper mastication. Indigestion due to the size of the portions swallowed can be prevented by scraping the apple and eating the pulp. This pulp is finely divided and digests without difficulty.

That the increased peristalsis caused by fruits is not wholly due to the pulp is proven by the fact that fruit juices will have a similar laxative effect. Besides all of the other good qualities mentioned, the fact that fruits, by their odor, appearance, and flavor, increase the appetite, is of no small importance. That which tempts the appetite increases the digestive power.

The use of fruits should not be limited to one meal a day or to a small portion served in a small sauce-dish, as is done in some families. It should be on the table at every meal in ample quantity. The old saying "a barrel of medicine or a barrel of fruit" is almost literal truth.

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Of course, in the early days of Kansas fruit was a luxury that could be afforded by but few, but that time is past. There is an abundance of fruit and it should be used freely, not as an extra, but as an essential. Increasing the appetite, purifying the blood, and stimulating digestion, as it does, its importance cannot be overestimated. The maxim that "fruit is gold in the morning, silver at noon, and lead at night," is a fallacy. Fruit is "golden" all day, and a well-ripened apple eaten the last thing before retiring will frequently insure sound sleep and good health.

The rule should be: Fresh fruit in season; stewed and canned fruits when fresh fruits cannot be obtained; dried fruits when neither fresh fruits nor canned fruits are available; but fruits in some form all the time. Home-canned fruits are cheaper and better than those which must be bought. Unfermented grape juice can be made almost without labor. The cider-press can be put into use, the juice extracted, sterilized and canned by the gallon, and the fruit punches that are considered the correct thing for company receptions can be frequently introduced into the family dietary with advantage.

NATURE STUDY IN THE COMMON SCHOOLS.

By Miss Eva Schley, Topeka.

Broadly speaking, nature study is the study of the universe, from its most complex constellation to the humblest atom of its composition. Brought down to earth it embraces study of that planet, physically, in its relation to the solar system, in the causes of day and night, change of season, its own revolution and rotation, with the resultant influence on the ocean currents, prevailing winds and tides; chemically, in the composition of the earth's crust, of rocks and minerals, metals and soils; biologically, in the plant and animal kingdoms found upon it. Nature study is limitless in its scope and may be wide in its application to our needs.

THE BEGINNING OF NATURE STUDY.

The study of nature began when God placed Adam and Eve in the garden of Eden "and blessed them, and gave them dominion over the fish of the sea, the fowl of the air, and over every living thing that moveth upon the earth." The stimulus to this first lesson was curiosity—that desire for discovery and exploration which has always been exhibited through the countless generations; and though the experiment in this case was not entirely a success, the world at large has never entirely forgotten that apples are good to eat and that snakes are not always to be trusted.

We have no other record of primitive man's first experiences with nature on the food question, but though the Bible says, "Take no heed what ye shall eat," I doubt not that the trail of the culinary science is strewn with the bleaching bones of the victims of this branch of nature study, and deep into the human mind has sunk the lesson which we hear repeated on every side in the advice given the young child, "Don't eat it—poison—it will kill the baby."

The discovery of fire marks an epoch in nature study, and must have been marvelously wonderful to our remote ancestors, for they immediately set about to make it, and thereby learned another of nature's lessons—the conservation of energy, heat, then light; and though modern man has com-

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pleted the cycle, I doubt if he feels the exultation of his forefathers. No wonder they worshiped fire and made it a part of their religious ceremonies, and in their efforts to keep it ever glowing unconsciously founded the firmest institution of modern society—the home.

The establishment of the home introduced, or rather developed, two other phases of nature study—plants and animals in their relation to man. Somewhere along the line of progress man learned to love his dumb neighbors; perhaps, having killed the mother, he carried the young of some animal home and tamed it; perhaps some wounded animal, which was not needed at once for food, was allowed to live until he had learned to love it. From here it was an easy step to flocks and herds, and in the keeping of them the necessity of food supply brought man his first lesson in economic plant life.

THE TEACHER'S PROBLEM.

The problem which confronts the teacher of nature study to-day is the same problem which has confronted the race since the beginning; that is, discovery of the different forces of nature and experiments to learn the laws governing them; the learning of interesting facts concerning the animal and plant world, their interrelations and interest to us from an economic standpoint, and, above all, the appreciation of the wonderful beauties in nature.

The object of nature study is to widen the horizon for the child, to keep him ever alive to the mysteries everywhere around him, to make him want to see and to be and do more than he would have seen or been or done without it—to give him practical ideas.

NATURE STUDY AS TAUGHT IN THE SCHOOLS.

I can best tell you something of the teaching of nature study by describing some of the work my classes have done in school—we have two entering classes a year, one in the fall, the other in the winter, and the work is different in the two classes because of the difference in material available for study at the two seasons. But in either case one of our first lessons is in keeping what we call a weather record; these records are kept for the day from midnight till class time, and consist of the date, whether clear, cloudy or foggy; precipitation, whether rain, snow, sleet, or hail; the temperature at class time; the barometric reading; time of sunrise and sunset; when the moon rises and sets; and the morning and evening stars. This record is kept every day throughout the term. It has not been kept many days, however, until some boy or girl wants to know why the barometer is higher one day than the next. This is just the opportunity I have been waiting for, to tell them all I know about the origin of storms among the islands south of Asia, where the water is very shallow and is consequently heated to a higher temperature than the surrounding ocean. Each day the warm humid air rises from these seas until it is taken hold of by the outer atmosphere and carried across the Pacific ocean, striking our coast at about Washington and Oregon, crossing our continent in a southeasterly and then in a northeasterly direction, and bringing with it, under proper conditions, rain or snow, depending on the temperature.

Then follows the reading of the weather maps gotten out by the Weather Bureau and the learning to predict the weather for to-morrow. Here we have gained quite a local reputation among the football boys and are called upon to predict the weather for days ahead in the event of a game. At this

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time also we learn the cause of the changes of season. With a discarded bicycle wheel, two rubber balls, and a fixed object in the room, we improvise a solar system, with all the necessary fixed and rotating bodies, to show that summer and winter are caused by the tilting of the earth on its axis and not by the sun moving north and south—a common childish belief. Another thing studied in connection with the weather record is the skyameter, an instrument to measure the amount of surface covered by a beam of light. A block of wood six inches square and a foot long is placed in the sunlight, and the shadow it casts is measured from time to time. Of course if the experiment is performed in the fall of the year the shadow increases in length as winter approaches and reaches its maximum length at the winter solstice in December. The children are told then that a ray of light is brightest and hottest when it is shining straight down, and decreases in brilliancy and heat as it strikes a surface more obliquely. With this information it is easy for the pupil to reason out that the tropics are hot because the sun always shines straight down, that our climate is milder on account of the oblique rays, and that winter and summer are caused by variations in the slant with which the sun's rays strike us—all of which the pupil may have recited glibly enough, parrot fashion, in his geography recitations, and have given less than no thought to because he did not understand it.

Questions in connection with the weather are almost numberless, and are always intensely interesting to children. We pay considerable attention to it, because the United States Weather Bureau is doing some fine work along this line, and people should be able to understand and take advantage of the predictions and forecasts which the bureau publishes.

INSECT LIFE.

One branch of nature study which we take up in the fall is that of insect life. I have found that pupils, even of high-school age, are almost totally ignorant of insects, and the horror which the majority of them exhibit at the sight of a bug is second only to their unqualified ignorance of the life and habits of the little animal. Therefore, we begin at the beginning by catching enough insects (usually grasshoppers, because they are so common and the timid girls are less afraid of them) for the class, and make a careful study of their personal appearance—how many legs and wings, the parts of the body, the three simple eyes and the two compound ones (always a surprise to the class), and the crowning feature of all, its mouth parts. After we have exhausted the external features of the insect we study the life history. The life history of the moths and butterflies is particularly easy to study at this time of year because the caterpillars are spinning their cocoons or forming their chrysalids preparatory to the coming winter. This change of form is a complete surprise to the pupils, and they eagerly collect various kinds of caterpillars to find what sort of cocoons they will make.

The habits of insects are studied from the standpoint of their economic relations to man, and upon this basis are separated into those beneficial to us and those harmful in one way or another. In the former class belong the bees, wasps, bumblebees, and hornets. Into the latter class fall the chinch-bug, Hessian fly, army-worm, and very many others. We discovered two new (to me) harmful insects this fall, the elm-twig girdler and the cottonwood-twig borer. Both cause the twigs to drop in the fall and prac-

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tically destroy the season's growth. We cut open the twigs and found in the case of the elm-twig girdler the eggs at each bud on the twig, and in the cottonwood twig the borer was at the base of the year's growth. When confronted with the question, "What should be done to destroy the insect, should it become a pest?" the pupils were unanimous in their decision that if the twigs were gathered and burned it would destroy more individual insects than at any other period in its life history. This was precisely the advice given in the Manhattan Agricultural Bulletin, as we afterwards learned. By this you will see that, given the conditions, the pupil is able to think out a good solution to the problem. We study life histories of the insect—that is, egg, caterpillar, chrysalis, and the adult stages particularly —because so many of our injurious insects do most of their damage in the caterpillar stage, when they are hard to cope with, and are lost sight of in their earlier and later stages when they may be more easily handled. To show you that this kind of information is valuable, and also that it is needed, I have only to tell you of an incident which came under my personal observation. An acquaintance of our family, a farmer from southern Kansas, was visiting us. We got into a discussion of farm life in general, during which he told me of the destruction which the army-worms had caused that summer in attacking his corn, which they completely devastated. "And," he concluded, "in a few days every one of those worms went down into the ground. The ground was full of little holes where they went down." He thought that each little caterpillar had lived its allotted time upon this earth and was ready to seek its happy hunting-grounds, and had accommodatingly buried itself before doing so. When I told him that each little worm would hatch out a full-grown moth next spring, and that each female would lay from fifty to a hundred eggs, he began to be interested in earnest and was anxious to know the remedy.

The study of insect life leads naturally to the insect enemies—our friends —the birds, snakes, frogs and toads, spiders, and even the thousand-legged bugs—all of which depend more or less upon insects for their daily living. If that farmer I told you of had plowed his field that fall just below the depth that the army-worm went down and had watched the flock of blackbirds and crows in the wake of his plow, eating those very same army-worm chrysalids, he would have come to some realization of the value of birds.

TREE STUDY.

In the spring, when the leaves begin to come out, we make a study of trees, both forest- and fruit-trees. Last year the pupils learned to recognize from their leaves fifty kinds of trees that grow in or near the city. This was exclusive of a half-dozen or so of the commonest trees which they all knew. From here we branch into forestry—one of the great economic considerations of the day from the lumber standpoint. Here, of course, we can do no real work. I read or tell them about the work of the United States Department of Agriculture along the line of forestry, because of the increasing demand for lumber and the constantly decreasing supply. This year I am trying to interest my classes on the subject of nut-producing trees. Little or no attention is given the cultivation of our most valuable nut-bearing trees. The reason for this neglect is hard to find, since the demand for them is good and increasing and the prices high. Pecans, almonds, English walnuts, and filberts, sell for twenty or twenty-five cents per pound

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in all markets, and even reach as high as forty cents per pound in the larger cities. Trees might be planted in the city to advantage, for many of the nut-producing trees are also valuable for shade.

A STUDY OF SOILS.

Another lesson which is given in both terms is that of soils. A given amount of gravel, sandy, humus and clay soils is sifted to determine the amount of gravel, coarse and fine sand which they contain. The residue is burned to determine the amount of carbon in each. After having determined the composition of the soils in this way, we pour a given amount of water on equal amounts of the different soils to find their relative retention of moisture. Then follows a discussion of the values of soils according to their stratification of surface soil and subsoils. Then we study the effect of decaying vegetation upon the soil. We find the proportion of gases, carbon and mineral matter in definite amounts of leaves and of wood separately by heating and then burning them and weighing after each process. It is ever a surprise to the children to learn that the amount of mineral matter in the leaves far outweighs that in the wood of the same tree—in some kinds weighing as much as sixty-eight times that in wood. Here, too, they discover why it is that in the woods the soil is so much richer in carbon than meadow soil, and are able to tell why a crop of weeds plowed under will give more carbon to the soil than it took from it.

These are a few of the things we do in nature study. There are many others, such as our semiannual visit to the electric-light plant, a source of delight to the boys, who will discuss learnedly for days after the different kinds of steam-chests, cylinders, throttle-valves, etc., till it fairly makes the wheels go round in the girls' heads, when we are obliged to quit the interesting subject for something more general.

An objection to the teaching of nature study is the inability of the average teacher to handle the subject intelligently and practically. This objection may be readily obviated by gradually raising the educational qualifications of the teaching force, so as to make them embrace the elementary sciences of botany, zoölogy, chemistry, and physics. Such a change would necessarily be gradual, but in the interim no hardship would be worked on the individual teacher, and the inestimable benefits to be derived deserve the championship of all educators and of all progressive citizens.

SECRETARY BARNES: We have had an excellent evening, and I hope you have thoroughly enjoyed the program. I desire to make a few personal remarks. I have, as you know, been secretary of the State Horticultural Society now going on twelve years. This has been my workshop for many years. You all know that this afternoon a new secretary was elected, and I will retire June 30, and I shall not make up the next program. Being a life member, I have the interest of the Society at heart, and will meet with you as often as I can. I shall do all I can for the good of the Society. I wish to thank all members of the Society for courtesies extended to me. There has been the most complete harmony in the Society for almost twelve years. I am not reflecting on the Society's past, before I came here, but there has been most complete harmony since I have been here. You all know when I came to the Society, on the 1st day of July, 1895, we had a little desk and a chair in a room with the state labor commissioner. Now we have these fine rooms [alas! we have them no more] well furnished.

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The furniture now in the rooms is not all, as the tables now in the corridor are kept for display in the center of the room, but have been placed in the corridor to make room for this meeting.

At this our last evening session before closing I desire to express my gratitude to you all; not only for the courtesies extended to me, but also for the willingness with which parties have taken places upon the programs. Parties who have appeared before you for the last ten or eleven years have come from many states of the Union, and they have come willingly. I have asked scarcely any one to take a place upon a program but that they have gladly taken it. After the next paper the music will continue until ten o'clock; longer, if you want it. Make yourselves at home in a social way, and enjoy each other's society. This will be our last night; to-morrow morning this meeting will close.

A FRUIT GROWER'S LETTERS TO HIS CITY COUSIN.

By Mrs. Geo. E. Rose, Rosedale.

COMMONPLACE FRUIT FARM, March, 19—.

DEAR COUSIN—Windy March has blown away the frost of winter. Sap is beginning to stir, buds to swell, and the ground lies fallow for the plow. The great annual resurrection is at hand. The miracle of miracles! A little wind, a little rain, a little sun, and the dead earth lives again—lives and throbs in riotous life and beauty.

The first bluebird has appeared on the apple boughs, and the first tree agent has just disappeared down the road. Rollicking fellows, both! One as irresponsible as the other. The featherless biped came in to dinner and tried to work me for more favors to pay for it. Our nearest neighbor is an extensive fruit grower, a shrewd fellow, who buys largely but with extreme caution. My agent asked for a letter of introduction and an indorsement. Now I sell trees myself when I get a chance, so for answer I told him the story of the colored brother who tried to join the Episcopal church out here. The clergyman was troubled. Clearly he could not refuse the consolation of religion to his dusky brother. Clearly the darkey was not a desirable addition to his flock.

"Are you sure you are prepared to join the church, Rastus?" he asked. "Better pray over the matter first."

Rastus came again.

"Did you pray as I told you to, Rastus?" asked the rector. "Yes, suh; I done ask the Lord about it." "What did He say?" "He say, 'Good luck, Rastus. I'se been tryin' to jine that church for twenty years myself.'"

A few more weeks and a million blossoms will transform the worn old earth into a pink-and-white baby world. But as the earth grows young, I am grown suddenly old with a thousand cares and worries. We are rushing to dig plants, set out trees, put in potatoes. We must hunt the frisky borer, cut out the rusty blackberries, and keep out a wary eye for scale. It is time for me to finish the tent-caterpillar, or he 'll later finish me. O that I were some sort of human centipede, with fifty hands and fifty feet at my command.

You once compared the fruit grower to the care-free cherry-bird—

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nothing to do but to gather the fruit as it ripens. Rather is he like a worm—if not the centipede, then the measuring worm—for, as the farm journalist puts it,

"When he goes out for pelf,
He stretches to the limit, and then he humps himself."

This is the age and season of graft. Strange, is it not, that the fruit-grower, the only man in whose business graft is legitimate, should have so little use for this get-rich-quick method? Where is the Morgan or Rockefeller who will show us what can be done in the way of horticultural graft? Think of what might be done in the way of watered nursery stock. Imagine a box of trees being inflated so as to sell for a full-grown orchard.

When the progressive grafter learns to grow peaches, pears and plums from the same root, so as to insure a succession of crops and profits, then will occur that return from the counting-house to the farm, so long foretold.

And now to rest, for I must be out by starlight to begin another day.

APRIL, 19—.

Your last letter was devoted to the joy of country living as it ought to be—and isn't. How beautiful it looks—from a distance, and on paper! You write: "What an inspiration to stand under the fading stars and feel the soul's uplift as the sun sends his first beams from the glowing East to kiss the hilltops." Now I am usually slopping pigs and currying mules long before the sun has kissed anything, and his first beams too often find me uplifting old Brindle's right hind sole from the milk-pail. It's a long time since you lived in the country, Cousin.

I read your rhapsody to Mrs. Fruit Grower. She heard it with a sigh. "I don't think I've seen a sunrise for years," she said. To my look of surprise she answered, "The kitchen is west of the house, where the sun's rays do not reach till ten o'clock. Though suns may come and suns may go, cooks must go on forever. I have read of the dewy freshness of the early morning, of the sweet new smell of the earth and its blossoms, but for me the early morning savors only of familiar kitchen odors. If I should wake up in Paradise, I am sure I should sniff for fried bacon."

In this I agree with you, Cousin. Early rising is a beautiful thing—for the other fellow. For myself, with John G. Saxe would I sing:

"Blast the man with curses loud and deep,
Whate'er the rascal's name, or age, or station,
Who first invented, and went round advising,
That artificial cut-off—early rising."

"I like the lad who, when his father thought
To clip his morning nap by hackneyed phrase,
Of vagrant worm by early songster caught,
Cried, 'Served him right!—it's not at all surprising,
The worm was punished, sir, for early rising.'"

Poor Richard's proverb does not hold in this day and age. The man who is early to bed and early to rise may be healthy, but he is no longer wealthy or wise. Does your captain of finance go to work with the bees and the ants? Not much! He motors to his office some time near noon. Early rising is a necessity for the man who earns his bread by the sweat of his brow, but in this day of combinations the man who makes more than his daily bread, makes it by the sweat of other men's brows. The toilers are punished, like the worm, for early rising.

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MAY, 19—.

Still "babbling o' green fields," Cousin? Still warning me against the lure of the city? If town life has proved so great a good for you, why should it prove so great an evil for me? My inference is similar to that of my small neighbor, John.

"Johnnie," said his mother impressively, "I married your father because he saved me from drowning."

Johnnie was unimpressed.

"I'll bet that's why pa's always telling me not to go swimming," was his comment.

So you envy the fruit farmer "the pleasure of gathering the first delicious berries for his own table." Why, that is equal to Lord Dundreary's famous remark, "I wish I were a wobbin so I could have fwesh eggs every morning for bweakfast."

We would as soon think of eating our own progeny as the first ripe strawberries, and indeed it would be scarcely more fatal to our offspring. Whence come the shoes, caps, jackets, and school-books for the young fruit growers? Do you imagine they grow on some hybrid tree or bush? Berries we shall have a-plenty, but the first and finest go to the city market. At least, we send you the finest looking, for city folks are strong on the outward and visible form, while the growers look more to the inner and toothsome substance of the fruit they eat.

A scare-head advertisement induced me to buy a new and untried box machine direct from the manufacturer. If I could get hold of said manufacturer, he would look worse scared than his advertising sheet. With the work crowding everywhere and the berry season at its height, I must spend every spare moment teaching that machine to box. Adieu, Cousin. I'm off to the boxing match.

JULY, 19—.

DEAR COUSIN—You still reprove my sordid life. You wonder that my mind is not alive to the great world's work; that my eyes are not open to the beauty of sky and tree and blossom. If all the beautiful things written of the farmer's life were true, the farmer might well sit down and order his ascension robe. If he were the poetical, impractical creature which his environment ought to make him, how could he cope with the expressman and the wily commission man? What would he know of rebates and their remedies?

The grandest attempt ever made at high-minded farming proved a grand failure. The finest minds this country has ever produced gathered at Brook Farm to try "plain living and high thinking." The plain living they could manage, but after a day of toil under the burning sun they found themselves incapable of any kind of thinking. I take no shame to myself that I cannot do what Hawthorne and Ripley, Dana and Emerson failed to do.

You remind me that Cincinnatus went directly from the farm to become dictator of Rome. I remember that Cincinnatus could plow, but I also remember that he dropped his plow-handle like a hot brick when another job was offered him. History tells us that he left his plow standing in the middle of the field to go scampering off to Rome. Great farmer, he!

As to my poetical disabilities, let me plead that the real poetry of farm life has never been written. Poems of nature we have in abundance, odes to spring, and sonnets to flowers; but where is there a Burns to write an

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"Ode to a Pig," or a Scott to write "The Lay of the Helpful Hen"? In the fruit grower's own realm what a wealth of subjects are offered.

How poetical would be, "Lines on a Grape Slug," "The Tent-caterpillar's Lament," "Sonnet to a Plum Gouger." With what joy, literary and otherwise, would we herald "The Canker-worm's Funeral Hymn," or "Lines on the Death of the Curculio."

To paraphrase Longfellow's well-known poem, how would this do?

"There are no fruit-trees, howe'er watched and tended,
But one big fat borer's there.
There are no orchards howsoe'er defended,
But show the blighted pear."

Here is another possibility:

"Tell me not in mournful numbers,
Spraying is an empty dream!
For the codling-moth but slumbers;
Give him fits and Paris green."

As I said, the real, or, more properly, the realistic, poetry of a farmer's life is yet to be written. There are a few exceptions. Here is one:

"He met her down in the meadow,
When the sun was sinking low,
And they walked along together
In the twilight afterglow.
She stood by and patiently waited
While he gallantly lowered the bars,
And her eyes were fixed upon him
Like gentle, twinkling stars.
She neither smiled nor thanked him,
Because she knew not how;
For he was a simple country lad
And she was a Jersey cow."

SEPTEMBER, 19—.

The summer has gone to the limbo of the past. The rush is as good as through. The fruit harvest is well nigh over. It has been one of the summer's disappointments that you could not be here to enjoy the beauties which you so prize, but which seem somehow crowded out of our lives. Mrs. City Cousin, when here last year, was heard to say, "If I lived here I should sit on this lovely porch the live-long day and watch the changing sky and the shadow trees."

"If you lived here," said Mrs. Fruit Grower, "you would probably find something else to do."

"O but you surely do spend much of your time on this big porch?" protested Mrs. City Cousin.

"Why, yes," said Mrs. Fruit Grower, "it has to be swept and scrubbed."

Since you could not come to us, we are coming to you. We are coming to the city for a long, deep breath of smoke-laden, dust-colored, germ-infected air. What doth it profit a man to have a whole country full of fresh air if he have not time to breathe the same. When we find machinery to do away with the drudgery outdoors and in, country living will be worth while.

NOVEMBER, 19—.

Home again! Home! What magic in the word. The finest poems written seem too weak to tell the wanderer's joy on getting home. I would not

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take a million for what the city taught me, but I don't want another penny's worth of wisdom gained that way. How often I have envied you the bodily ease of your life. It did not prove easy for me. I felt like a caged jay-bird, perched up in that hole-in-the-wall which the city-dweller calls a flat, and which you call home.

You remember that in the old fable all the weary-laden ones of earth piled their sorrows in a great heap, and each took therefrom some other man's trouble. The hunchback traded with the father of a dissipated son, but in the end every man came back and gladly took up his own burden again.

The hoes and spades and plows look like jolly good fellows after my brief city sojourn. I even gave a friendly pat to the obstreperous box machine, and I notice that Mrs. Fruit Grower is sweeping her big rooms and porches with immense satisfaction.

One of the helps of my city visit came from a book in your library by President King, of Oberlin College, entitled Rational Living. Perhaps, after all, the most inspiring thing about it is the title. Rational living! sane living! intelligent living! reasonable living!

In France, in the eighteenth century, Rousseau made simplicity fashionable. "Back to nature" was the cry from the garret to the salon. It would be well if the world saw another epidemic of simplicity, and the farmer needs the reform no less than his city cousin.

We are perhaps less artificial in the country. I doubt if we are more rational. Reasonable country living ought to bring us as near a perfect life as can be attained in an imperfect world. My letters have proved me unreasonable. I am self-convicted of what the author calls "blue-rose melancholy," a feeling that great things would be easily accomplished if only conditions were different—if only the roses were blue.

The drudgery of farm work has always been my grievance. I wished to reap, but not to sow. My author preaches from a new beatitude, "Blessed be drudgery." "Nine-tenths of all the work that produces results must be drudgery."

Longfellow expresses the thought in this way: "The every-day cares and duties, which men call drudgery, are the weights and counterpoises of the clock of time, giving its pendulum a true vibration and its hands a regular motion; and when they cease to hang upon the wheels, the pendulum no longer swings, the hands no longer move, the clock stands still."

Then comes to mind Carlyle's impatient appeal, "Produce! Produce! Were it but the pitifullest, infinitesimal fraction of a product, produce it in God's name! 'Tis the utmost thou hast in thee? out with it then. Up! Up!"

How to reconcile the simple with the strenuous life and fuse the two into rational living—that is the problem for those of us who would live well the little while given us here. The beauty of a rejoicing world is all about me. Why should my eyes be holden? "The mornin'-glories ain't lubly to de man wif de backache," says the plantation philosopher. Then it must be part of the business of my life to avoid the backache. The best of life comes not to the ease-loving and self-indulgent; neither does it come to him who is troubled with many things.

As my soul strives upward for its own good, there comes a vision of the great world's work, of its toils, its problems, and its rewards; there comes the more personal vision of those who hunger and are athirst, sick and in prison. From the spiritual heights comes the voice of the Lord as of old,

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"Whom shall I send and who shall go for us?" and always my heart would make answer, "Here am I; send me."

How weak and pitiful seems my life when I feel the throb of the great world's pulse! How ignoble to renew the search for apple-borers! Careful! Careful! O restless spirit of me! You are drifting to the land of blue roses again. Remember, the Master said, "Inasmuch as ye have done it unto one of the least of these."

I do not know the plan of the great All-Father for his children. I know not if we shall live and learn in more world's yet, and through ages yet to come, or if we shall reach the "Isles of the Blest" when life is ended here, but I am convinced, and it is enough for me, that we are put here to grow—grow in knowledge and grace and happiness. To quote again from Rational Living: "It is far safer to say with one of the world's best fighters, 'I count not myself yet to have apprehended,' than to sing with the modern religionist, 'I've reached the land of corn and wine.'"

There must be no ignoring of the daily task, but such rational living that while the hand strives for the world's material good the eye may be undimmed to its beauty, the ear undulled to its music, and the heart attuned to its deeper harmonies; a striving of the whole man "to let the spiritual, unbidden and unconscious grow up through the common." Blessed drudgery!

"Forenoon, and afternoon, and night; forenoon,
And afternoon, and night; forenoon, and—what?
The empty song repeats itself. No more?
Yea, that is life; make this forenoon sublime,
This afternoon a psalm, this night a prayer,
And time is conquered, and thy crown is won."

Morning Session.

December 29, 1906—9 A. M.

PEACH CULTURE.

By William Cutter, Palisades, Colo.

All of you know the impossibility of suggesting any mode of care or cultivation that will insure us a crop of peaches every year in this latitude. Still it is not unreasonable to assert that by carefully following the advice of the most experienced and successful we may improve our orchards, and get fruit more frequently and of better quality than we are now doing.

The most successful location for an orchard is the oft-recommended highest spot upon the farm. Its elevation allows the moving atmosphere to sweep the ground and carry off to nearest lowland any frosty blanket that may attempt to settle there.

These elevations are the poorest soil, and I have never seen a soil in Kansas too poor to grow good peaches, if properly cultivated. Trees grow slowly on such soil; they ripen the wood and buds earlier. The buds are small, and we all know that when a part of the buds are winter-killed it is always the smallest that survive. The fruit also ripens earlier, colors better, rots less, and is of better flavor than the larger fruit grown upon richer and more moist soil.

Trees grow faster upon very rich land; the wood is softer, and the buds

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are large and soft. They are easily saturated with water and do not stand the degree of cold that a small, compact, well-ripened bud does.

CULTIVATION.

Good cultivation will usually produce good fruit in spite of dry weather. But it is not advisable to stir the soil very deep in a bearing orchard. Neither is it advisable to go deep in the fall after the leaf has fallen. It destroys so many surface roots that the bloom is weakened and the set of fruit is likely to be poor the next year.

PRUNING.

This is a very important part of peach culture and the best of neither tree nor fruit can be grown without it.

No tree is capable of maturing more than one peach for every twenty blooms (when not damaged). They nearly all set fruit, after which comes the tug of war. All appear for a while to stand still, then the weakest begin to wither and drop. This continues until we hear the cry that they are all dropping off. The question of survive or perish has been settled. Now, do you suppose that this 1 in 10, or 1 in 20 if a full bloom, has starved all the others to death without being dwarfed and weakened?

The only practical way to prevent this struggle is by pruning. You cannot go over the tree and cut back every little twig, but you can cut back the whole top. This will not only reduce the number of blooms but will bring the fruit down within your reach, prevent the fruit from blowing off, and keep the tree from breaking.

In case the buds are part of them killed you may prune less. But, if they are all killed do not think there is no pruning required, for it has increased the necessity. It is a well-known fact to most of you that weather cold enough to kill the buds always damages the trees, and these trees will never recover their vigor and usefulness unless cut back severely; so, as soon as you find out that the buds are killed, screw up your courage and go at them—not with a pruning-knife, but a sharp saw, or even an ax, and do not stop until you have cut every limb back half-way to the body. By so doing the tree will make a good growth the next year, and in two years your tree will be better than it ever was or ever would have been without cutting back; and it will need very little pruning for the next two years.

VARIETIES.

In this list I do not expect to please you, for nearly everybody knows of something better, and if he should not, the first agent that strikes him can sell him a whole orchard of better varieties.

The first that ripened this year were Snead and Japan Dwarf Blood, both too poor to even talk about.

Alexander, Triumph and Dewey followed, and Dewey was the most satisfactory. Greensboro followed these closely, and it is worth more than anything ripening with it or before it. It is of good size, productive and *drought-proof.*

Carmen now steps in, and its hardiness, productiveness and good size knock all competitors out of the ring, except, perhaps, Fitzgerald, which is inferior in everything but quality.

Early Michigan is a white-fleshed peach, productive, of good size and fair quality. It butts right up against Elberta, but does not lap onto it.

Elberta is neither hardy nor good-flavored, and it has a whole lot of first-

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class competition, but none of them have any business in market with it. It is neither hardy nor productive, and is not recommended north of here. There is about as much of it planted as of all other varieties, and where it succeeds there is nothing that compares with it for profit.

The Champion, Captain Ede, and New Prolific ripen with Elberta, and should not be crowded out by it, especially for family use, this far north. Following these the Crosby is my favorite, but requires good care and perhaps thinning to get it to marketable size.

Here we come to two good ones, the Chair's Choice and Matthew's Beauty. The first will pay the best, but Matthew's is the best peach.

Salway now comes in to wind up the season, and it has no rival as a family or market variety.

Now add a few Heath's Cling and Bell's October, and you will have good peaches until frost comes, when you can go to the cellar and bring up a can of Crosby's, and you will have the best substitute for fresh fruit.

PHILLIP LUX: I was interested in the item on pruning in this paper. We had a very severe winter, I think, two years ago, and peach trees were all damaged, the wood was badly frozen, and we did considerable heavy pruning. The trees made a very small growth. A tree that is frozen badly makes little growth afterwards. It did not kill our peach trees, but it damaged them so that they did not accomplish much in the way of growth. Now these trees after pruning did not make the growth we expected. Last spring we had peaches that went through the winter, but most of the Elberta buds were frozen, and we had practically no Elberta fruit because of the pruning. So pruning in this instance was rather a detriment, on account of the heavy pruning the year before. Yet I believe that these trees will be prolonged in life and will come out and make up for what they have lost, because the older trees were so high they were nearly worthless. But it cut out the crop of Elbertas to a great extent. With the Crosbys it was better. They were not frozen so badly and they made a good growth of top.

MR. DIXON: I want to indorse the paper. It was a good one and entirely practical.

PRESIDENT HOLSINGER: We will have the report of the committee on railroad rates.

MR. DIXON: In the absence of the committee on railroad rates I can make a little verbal report of my own. At the last session there was some agitation in regard to railroad rates, and a committee was appointed. We had to work without funds, and for those who desired to ship in car-loads it was right to give their time. We didn't spend any money except for stamps. We found that the commission merchants and other shippers were working for a reduction of freight rates on apples and other fruit in the state, and after considerable correspondence with various traffic managers in the state they agreed to call on me, and did call before the apple-shipping season began, and informed me that they had arranged to make quite a reduction in freight rates. They did not say just how much it would be, and it led me to believe that they were going to make a greater reduction than they did. Since shipping began rates have been reduced below last season from fifteen to twenty-five per cent. Still they are about fifteen to twenty-five per cent. higher than the potato rate, and why we can't have the same rate on apples

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in the state, or anywhere else, for that matter, as on potatoes, I don't know. I explained to these men that the bulk apples we had already transported in the state were a cheap grade and could not stand a high rate. My view is that the rates are almost prohibitive. When freight and commission is taken out of proceeds there is little left for the grower. The railroads get theirs always; they collect before the shipper gets his money. I believe with a little more agitation we can yet get better rates. It would result in a greater consumption of fruit if we could get better rates on the lower grades of apples, and these are the ones we want to get rid of. A first-class car of apples in my county always sells well, and the cheap grade will sell right along, but the freight rates are too high; and, besides that, the retailer wants big margins for handling apples. I shipped one firm in western Oklahoma fifteen car-loads on the Rock Island. They did well on them and I did pretty well; but the rates are as high as sixty-five cents per hundred to nearest points in Oklahoma.

I am not entirely satisfied with the work of the committee, as we worked under much difficulty, yet we may have accomplished some good. At any rate there was a slight reduction in freight rates.

MR. TAYLOR: I would suggest, under these circumstances, that this committee be continued and instructed to report at the next meeting.

B. F. SMITH (of same committee): I did not do anything. I did not have any car-loads to ship. I did do some corresponding, and that is about all. I favor everything Mr. Dixon has brought out. He has done all the work. He is more interested than I am. The chairman of this committee is not here; not having any apples to ship, he was not interested. We were not as active as we would have been had there been fruit to ship.

J. L. WILLIAMS: Mr. President, to get this properly before the meeting, I move you that the report of the committee be accepted and the committee be continued one year. [So decided.]

MR. TAYLOR: There was one subject discussed yesterday that it seems to me should have some further action taken with respect to it, and that is the San José scale. Some of our Hutchinson people who are right in the midst of it are here, and have been "up against it," as we say, and we would like to hear from Mr. Yaggy on this subject.

MR. YAGGY: It is rather late, but I simply want to represent our little Hutchinson contingent of fruit growers in their views as to the San José scale. San José scale is within twenty-five miles of the orchards in Hutchinson to-day. I think everybody is sufficiently familiar with the character of this insect and its work to know that while it is not now present in Hutchinson and Wichita, unless it is checked it will spread over the entire state. I don't think any one in the room can tell at just what rate the insect will spread; but this concerns us, and I believe in the principle of an ounce of prevention as against many pounds of remedy. I hope and urge that this organization sanction a bill devoted exclusively to the San José scale proposition. I was talking to a gentleman last night about San José scale, and he gave me several items of interesting information. Illinois, combating the San José scale, got an appropriation of $6500 annually. The intention in their law was to enable the state authorities to go in and spray orchards when the owners positively refused to do so, and charge that expense against the property, which was to be handled the same as a tax. In

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case the property had to be sold to meet the expense, it would be sold. With that very fine appropriation ahead of them the inspectors of the state of Illinois started out and spent the whole $6500 in one locality. They found one practically continuous Osage hedge 600 miles long, and the appropriation of $6500 ended right there.

The Indiana society is trying to get an appropriation from the legislature. In the states of Oregon and Maryland they have very excellent laws. The Oregon law enables the authorities to go in and chop down any orchard where no remedial measures are taken to prevent the spread of this scale. It is a definite, clear, good law, and if a man refuses to get into line and stop the thing his state chops down his trees. It does not require as considerable means as where the state authorities go out and spray the trees.

I would therefore propose, when we get action on this, and the inspector discovers San José scale, or any of us discover it, that a printed slip or formula be forwarded to the grower, calling his attention to the fact that under the laws of the state he is supposed to get out and spray his orchard; then if he refuses to do so, or if the spraying is not sufficient, under the law the state will chop down his trees and get rid of them. That would obviate the necessity of sending spraying machines all over the country, and would accomplish the same results.

Now, it seems that there are certain elements in every community that are opposed to certain features of almost every law in regard to San José scale. In many cases they have tacked onto the law certain clauses enabling some arbitrary inspector to walk into a nursery and order a whole bunch of stuff destroyed. While I am cautious of the nursery stock of this community, and nursery stock brought here from outside of the state, at the same time I much prefer that we get through the legislature a bill that will not antagonize any interest, for we must consider the nurseryman as well as the planter.

Missouri has no San José scale law. The strong and powerful nursery inspection of that state just wiped it out. I understand the same is true in Arkansas. I would therefore suggest (and I have thought along this line considerably, because we have been in touch with it and it is our hope, at Hutchinson,) that this Society will take an interest at least to this extent: that when this bill has been acceptably drawn up by the authorities that copies of it be forwarded to every member of this Society, and that these copies be forwarded to any political man having influence, so that the passage of the bill may be expedited and that it may be put through the legislature. If we tack on any considerable appropriation it is sure to be sidetracked. It seems that the present legislature is going to have a call for increased appropriations, and our only hope is in being very modest in our requests for appropriations.

A MEMBER: How extensive is it in your county?

MR. YAGGY: It is not bad, but when it is true that it is carried by every wind that blows and every bird that flies, and the many other ways to which its spread is attributed, the situation is hopeless to-day unless some action is taken soon to prevent its spread. We can control it at less expense and trouble than in any other way by spraying every second winter. That is sufficient for fruit; I don't know how that applies to ornamental trees and shrubs.

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We should go ahead and spray as before, and spray with more thoroughness. It will result in smaller production of fruit, and for that reason some will not do it, but that is the short-sighted view of it. We all want to benefit our trees, and all should work together on this proposition.

I desire to offer a resolution, or make a motion, that the chair be authorized to appoint a committee of five, including the president elect, and secretary elect, and three other members of this Society, to draft a bill that shall deal specifically and exclusively with the San José scale proposition.

Committee as named: Hon. Edwin Taylor, president; Walter Wellhouse, secretary; E. E. Yaggy, Hutchinson; W. H. Underwood, Hutchinson; J. F. Cecil, North Topeka.

A. H. GRIESA: I suggest as a remedy for San José scale, while it is yet limited in area, that a law be made authorizing the destruction of all infected trees wherever found. I suggest that wherever they are found infected they be cut down and burned; kill them, get rid of them. It will be a good deal better than to try to control it.

B. F. SMITH: What about the hedge fence?

MR. GRIESA: Dig them up and burn them.

MR. NEWLIN: Mr. Yaggy will do it; so will I do it; and Mr. Griesa will do it, too, if he can discover it in his orchard; but what about that little fellow over there that don't care anything about the San José scale? That is why I am so heartily in favor of a bill.

MR. YAGGY: I would suggest that when that bill is drafted it shall read "San José scale and other injurious insects."

G. W. COLLINGS: In the way of having a compulsory-spraying measure passed by the legislature there has been no definite action taken, and before this Society adjourns I would like to have it put itself on record. While I am heartily in favor of any measure for combating the San José scale, there are a great many other things that need combating as well. I would like to call up my resolution again and move its adoption:

Resolved, That it is the sense of this Society that the legislative committee should use its influence to procure the passage of some law providing for compulsory spraying for the destruction and control of noxious insects and fungous diseases.

G. A. BLAIR: I second Mr. Collings's motion. He moved the adoption of the resolution. [Carried.]

A. V. WILSON: At the first meeting of the Society there was a matter brought up by correspondence that was passed over until a later time, and in view of the fact that the Missouri State Society and kindred organizations have taken action along this line I would like to offer the following resolution:

WHEREAS, The Society recognizes the commission firms as among our best friends, as they represent a line of business that is serviceable for us, also for the consumers; and

WHEREAS, There are in the commission business many sharks and dishonest dealers that work hardships, not only on the producer and shipper, but on the honest commission firms as well; therefore, be it

Resolved, That we heartily indorse the movement that has for its purpose the enacting of some law that will give better protection to the shippers or otherwise improve conditions.

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The resolution was adopted.

E. B. COWGILL: This, it appears to me, is one of the most important subjects that has come before this body. The time was when we loaded our stuff into the wagon and took it to town and brought the money back with us. There was no trouble about it then, for they did not get the better of us while we had our eyes on our property. The case is much different now. The farmer's business is very much changed, and he has to reach distant cities by the regular modes of transportation, and has to depend upon the honesty of people that he knows nothing about for a square deal. This resolution looks to compelling a square deal. I am in favor of such a law, but it occurs to me that, in view of the fact that the farmer's business has changed throughout the country from what it was in the beginning, the farmers will perhaps find it to their advantage, and the fruit men particularly, dealing in perishable products and having to depend upon fair representation much more than the man who produces grain has to, that it would become incumbent upon fruit growers particularly to develop some means of protection very similar to those others of us in business had to develop.

I spoke a day or so ago and alluded to the ordinary commercial journals of information with reference to doing business. There is, however, in those general agencies one element that must be taken into consideration, and that is that these commission men are, nearly all of them, patrons, paying an average of $115 to $150 per year as clients, so that the reports that you get through the general agency is liable to be biased somewhat by the interest of the agency in preserving its patrons. I am speaking from what I know, and will say to you that the publishers of the country have found it necessary to institute a separate agency for the gathering of this kind of information with reference to people they may want to do business with.

For instance, you people who read the *Kansas Farmer* know that we have accounts extending from Maine to Oregon and Washington and down into Texas and New Mexico and Old Mexico, and we have accounts with men that we never saw and know nothing about, and yet our losses are almost nothing. How is this done? There is a publishers' agency whose business it is to give us information about these people. The other day we had from Nevada an inquiry for our rates, etc., for advertising—for several hundred dollars' worth of advertising, from a banking concern. There were two reasons why we wanted to investigate whether they were a good concern: In the first place, we didn't want to do the service without getting our money; and second, we didn't want them to use us as a medium for getting their claws into your flesh. We sent out an inquiry. We found in this publishers' agency that this firm was not listed. They were not on it at all. The rating of everybody that is listed is shown there. We sent an inquiry to Chicago. The reports which came back were such that we did not take their business. No matter where, whether in the United States or any place else, an advertiser writes to a publisher who is a member of this society and wants to do business with them, we are almost absolutely protected, because these people have their agencies. If they want to know about somebody here in Topeka they probably would write to us for information and would write to the banks; all take great pains to have this information reliable.

Mr. Whitaker and I took pains to run over the list yesterday of the rat-

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ings on the men who are listed in Topeka, and it is almost absolutely correct, and anybody who will take that book and undertake business with any of these people is doing business with his eyes open; not only as to how much money they are worth, but also as to the matter of their good faith, and all that.

What does it cost? We pay thirty dollars a year. It saves us probably several hundred dollars a year from losses that would have happened.

There is no such thing, as I understand it, in horticulture, and yet the risks you must take are greater than the risks we might take, because if a man gets the advertising that ends it, but your stuff is liable to cost you freight besides. I simply wanted to call attention to this and make these few remarks and the suggestion so that you might think of it, because the time has come when you need protection against sharks.

Commission men are not all sharks. There are some very good ones. They can report your stuff as arriving in any kind of condition and you have no way of proving otherwise. They may report that they had to sell it for less than freight, and you cannot prove that they did not. You have to depend on the good faith of these men. I am glad to know there are a great many of them that are worthy, and these are the men you want to know about, and how to reach them.

In the meantime, there is another suggestion I want to make. Something was said about the Minneapolis commission men. There are two excellent agricultural papers in Minneapolis. One is the *Farm & Home*, and the other the *Northwestern Agriculturalist*, and I am satisfied if any fruit grower in Kansas would write either one of these papers and inquire as to John Smith or John Doe, or any other person in Minneapolis, and ask for information about him, he would get that which is reliable and good. The *Kansas Farmer* answers many such inquiries. We don't charge anything for it. If you will send stamps along with your inquiries we will be glad to answer them, but if you don't we will answer anyhow. If it was sent out on postal-cards it would not hurt the informant any.

A MEMBER: Years ago, when I was shipping strawberries and other fruit, I always went to my banker and he would make inquiries in Milwaukee, Colorado Springs, or Denver, or any place where I intended shipping, and it cost me twenty-five cents to get all the information needed to show whether the parties were sharks or honest men.

MR. DIXON: I want to indorse the resolution, but I believe we are working the wrong line. To get down to business we really must have coöperation and eliminate competition, and the small individual grower has no means and really has n't the time and cannot afford the expense to find out the present rating of commission men and just what commission men to do business with; whenever we can coöperate and have honest men at the head of our coöperative societies, then we can get our fruit through and get our returns.

PRESIDENT HOLSINGER: We will hear the report of the committee on membership.

MR. WILLIAMS: There has been added a total of seven new life members (see roll in front). We have lost a few by their passing over to a better world. When prayer was offered here and ended with our Lord's

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prayer I found this entire assembly could repeat it, and that cannot be said of any other "bunch" of men on the face of the earth.

PRESIDENT HOLSINGER: I have before me a list of the life members. I find that there were 170 members in this Society. There are now 7 more added to that, which would make 177. I also took occasion to count the list of the Missouri Horticultural Society. In Missouri, with all her boasts and all her advantages, there are but 70 life members. So you see we have 107 more life members than the great state of Missouri with all her resources.

SECRETARY BARNES: Mr. President, I think I can improve on that report a little. The life memberships that have been issued number 212. The memberships laying before our president is of the actual, live, energetic members, while a complete list would include some of those who have gone. When the present secretary took his place here the life membership was seventy-six. The balance of them have been added in the last eleven and one-half years. The deceased members have been crossed off, so those on the list you have there, Mr. President, are all good, live fellows.

PRESIDENT HOLSINGER: I was in hopes that our genial friend [Irvin] of the *Western Fruit Grower* would be here. He says we have fifty per cent. more members here than Illinois, and seventy per cent. more than Missouri. Do you know, in the election of officers in Missouri the other day they cast forty-one votes. We cast eighty-nine. Kansas is at the front. See her grow!

MR. TAYLOR: I desire to offer a resolution. I might say that there was a committee appointed—a committee of conspirators—and they drafted this resolution and asked me to present it, which I take pleasure in doing.

[This resolution was one commending the eleven and one-half years' service of the secretary, William H. Barnes, and was accompanied by a fine gold watch-chain.]

The adoption of the resolution was moved, seconded, and carried by a unanimous rising vote.

Secretary Barnes was then called upon for a speech, and said:

Mr. President and Members of the Society: This touches my heart very deeply. I feel that I have only done my duty. When I came here I expected to put all the energy and ability I had into the work, and what I have done I have done for the benefit of horticulture in Kansas. I would say that, financially, this job is not attractive; that the man who understands horticultural work can make more money at it than he can in an office like this. I hope to spend the rest of my life in the country. Coming in here I put all my energy to the wheel, and have done the best I could, and my greatest satisfaction is the hope that I have done some good. Some of us can carry that kind of a reward with us, and feel that we have done some good in the world. After my retirement from this work, if at any time I can do any service for the Society my post-office is known, and I am at your service the same as ever.

I thank you very much for this resolution and this testimonial, which I shall carefully preserve, and I hope that the Society may go not a single step backward, but that it may go forward always. When I came in this room, August 19, 1898, the floors were bare and there was but little furni-

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ture. Now we have this furniture, which I got after a hard fight, and, after another, this carpet also. Your next secretary should add to what has already been done and fix up the Horticultural rooms. Let us have things nice as long as the Society is in existence. I thank you with all my heart for your earnest assistance—both those who have come here in person and those who have written me. Continue to write me as your secretary for the next six months and then give my successor your most hearty assistance.

MR. TAYLOR: Secretary Barnes has been extremely fortunate in his office assistants. He has been doubly fortunate, because he did not have to go out of the family for his assistants. Miss Lotta was his stenographer until she married, and then her work was taken up and borne with credit to herself by Miss Irma; and on behalf of this Society I am requested to present to Miss Irma Barnes, as a token of esteem, this gold bracelet.

MISS BARNES: I thank you all very much for this. It is very beautiful. But I have such a cold I can hardly talk. I thank you.

SECRETARY BARNES: I would take this opportunity to say that there is only one person in existence in this world that was with the Society at its formation. His picture hangs yonder on the wall. He lives in the mountains of North Carolina.

I also would like to remark, Mr. President, along the line of big societies, that there is one big society that every time it gets together brags about its membership being 1000. I was in Minnesota when the Grand Army was there. I was up in the office of the secretary. It was a little dinky office about like our toilet-rooms there. He has three or four samples of fruit. He said, "We have 1000 members." I said, "Your members are nothing but a list of subscribers." If you subscribe one dollar and take the paper you are a member of the State Horticultural Society. Each gets twelve copies of a monthly paper, and at the end of the year a complete bound annual. Now, their 1000 members are merely 1000 subscribers to the horticultural paper, and that makes them strong (in number only), and they come into the national meetings and brag about the great big Minnesota Horticultural Society. Our people are all *active* members.

REPORT OF COMMITTEE ON EXHIBITS.

By A. V. WILSON, Muncie.

Before proceeding, I will say that the collection of apples is a very good one, although I would have liked it better had there been a larger exhibit of other varieties of fruit. I also noticed the absence of many kinds of preserved fruit which have heretofore been on exhibition. We think this one of the departments that might well be taken into consideration. I wish, as one of the committee, that this particular line might be encouraged, and that samples might be brought and shown at the meeting. I would like, also, to call special attention to the exhibit of apples made by Mr. Newlin, from near Hutchinson. You will find in the exhibit some very choice specimens, and the exhibit is worthy of careful inspection. It shows that the fruit has been well taken care of, as well as the orchard where it was grown. I would especially call attention to his box of Grimes' Golden; also, to the

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exhibit made by the two horticultural societies from the Arkansas valley and Sedgwick county, and also Mr. Blair's exhibit.

PHILLIP LUX: Were the Grimes' Golden in cold storage?

A MEMBER: Yes, sir; they were at Hutchinson in cold storage before exhibit. The box was taken out and placed on exhibition at the county fair and then put back in cold storage, and brought to this meeting and placed on exhibition, and I suppose will now be put in cold storage again.

PHILLIP LUX: Our white apples, nearly all of them, placed in cold storage, have become discolored; have rusted. We find that a good ripe apple keeps in storage better than one picked too early; but in this case I think they were kept too cold. Our apples got to a point where they had to be put on the market four weeks sooner than usual. Perhaps it is because they ripened earlier last fall. But the condition of the packing had nothing to do with discoloring in storage.

A. V. WILSON: I saw no rust on that box of Grimes' Golden. They are in very good condition. I would also like to speak of ex-Governor Glick's exhibit of seedlings. In cutting one of them I can't say very much for it. It is rather coarse-grained and not of extra good flavor, although it has a good appearance.

The second award was given to Mr. G. A. Blair, and the third to Mr. C. A. Blackmore, $5; to the Arkansas Valley Horticultural Society, $4; the Sedgwick County Horticultural Society, $4; and other smaller amounts, ranging from 50 cents up to $2.50.

I hope that the crop next year will justify a display double what it is this year. There are now about 200 plates on exhibition besides the boxes.

I would like to speak of the packing of the boxes of apples. There is a great deal in the way the apple is handled in the orchard, and the way it is packed in the box, as to whether or not it will keep successfully. I think that is one secret of success in the keeping of apples in cold storage: the way they are handled. If they are properly handled in the orchard and properly packed we can feel reasonably sure that they will keep. There is one exhibit of apples on the table that was picked too green. These apples have been kept for some time and they still are too green, and I doubt if they ever will ripen; and if they do ripen they will probably not have a good flavor. I think we need to study and read up on care in picking and handling and in packing for storage purposes.

PHILLIP LUX: Don't you think cold storage has a tendency to rust white apples?

A MEMBER: It is shown in some of the apples. Perhaps the temperature has been a little too low.

PHILLIP LUX: Our white apples in storage are, regardless of packing, colored and rusty. They have to be pushed on the market in order to get anything out of them.

A MEMBER: That would come about from the condition of the fruit when it was packed.

PHILLIP LUX: The packing has nothing to do with it in this case.

A MEMBER: I was going to say that they were not in perfect condition at the time they were packed.

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EXHIBITS.

The following is a list of exhibits:

By William Cutter, Junction City, Geary county, three plates: Sphor, Winter Banana, Delicious.

By ex-Governor Glick, Atchison, Atchison county, six plates: seedlings.

By W. B. Eames, Delphos, Ottawa county, two plates: Missouri Pippin, Jonathan.

By Capt. E. P. Diehl, Olathe, Johnson county, one plate: York Imperial, grown on tree thirty-six years old.

By J. B. Wheeler, Oskaloosa, Jefferson county, four plates: Mammoth Black Twig, Missouri Pippin, Winesap, Minkler.

Sedgwick County Horticultural Society, twenty plates: Missouri Pippin, Janet, Winesap, Mammoth Black Twig, York Imperial, Huntsman, Arkansas Black, Ben Davis, Jonathan, Stark, Huntsman; Kieffer pears.

Arkansas Valley Horticultural Society, twenty plates: Winesap, Mammoth Black Twig, Ben Davis, Gano, Arkansas Black, Missouri Pippin, York Imperial, Smith's Cider, Shockley, Red Stark; Stark; Kieffer pears, Garber.

By Geo. A. Blair, Mulvane, Sedgwick county, two boxes: Ben Davis. Twenty-two plates: Little Romanite, Winesap, Ben Davis, Smith's Cider, Missouri Pippin, Gano, York Imperial, Stark, Red Stark, Janet, Shockley; Kieffer pear, Garber.

M. W. Gilmore, Topeka, Shawnee county, six plates: York, Missouri Pippin, Mammoth Black Twig, Ben Davis.

By Essex county, Ontario, Canada, one plate: Ben Davis.

By S. H. Weith, La Harpe, Allen county, twelve plates: Jonathan, Arkansas Black, Huntsman, Rome Beauty, Winesap, Gano, White Pippin, Ben Davis, Willow Twig, Lawver, Unknown.

By J. B. Fergus, Kincaid, Allen county, eleven plates: Winesap, Jonathan, Minkler, Dominie, York Imperial, Willow Twig, Mammoth Black Twig, Ben Davis; Kieffer pear.

By C. A. Blackmore, Sharon, Barber county, twenty-five plates: Winesap, Gano, Missouri Pippin, Ben Davis, Mammoth Black Twig, Minkler, York, Arkansas Black; Crab; Kieffer pear.

By B. F. Van Orsdol, Topeka, Shawnee county, eleven plates: White Winter Pearmain, Janet, Winesap, Grimes' Golden, Dominie, Unknown.

By A. E. Dickinson, North Topeka, Shawnee county, four plates: Milam.

By Walter Wellhouse, Topeka, Shawnee county, six plates: Jonathan.

By C. L. Smith, Topeka, Shawnee county, eight plates: Winesap, Ben Davis, York Imperial, Unknown.

By Whiteker Bros., Topeka, six plates apples.

By E. J. Whitaker, Topeka, Shawnee county, three plates: Winesap, White Winter Pearmain, White Pippin.

By Frank Dixon, Holton, Jackson county, two boxes: Gano.

By William Newlin, Hutchinson, Reno county, five boxes: Grimes' Golden, Jonathan, York Imperial, Ben Davis, Winesap. Thirty-five plates: Winesap, Mammoth Black Twig, Lawver, Rome Beauty, White Pippin, Missouri Pippin, Jonathan, Janet, York Imperial, Fallawater, Grimes' Golden, Ben Davis, Smith's Cider, Rambo, Arkansas Black, Huntsman, Baldwin, Roman Stem, Pennsylvania Red Streak, Noname.

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By Alfred Gray, Paxico, Wabaunsee county, five plates: Pennsylvania Red Streak, Huntsman, Winesap.

Awards were made as follows: Wm. Newlin, $10; Frank Dixon, $1; E. J. Whitaker, 50 cents; C. L. Smith, $1.40; Walter Wellhouse, $1; A. E. Dickinson, 50 cents; B. F. Van Orsdol, $1; C. A. Blackmore, $5; J. B. Fergus, $2.50; S. H. Weith, $2; M. W. Gilmore, $1.50; G. A. Blair, $7.50; Arkansas Valley Horticultural Society, $4; Sedgwick County Horticultural Society, $4; J. B. Wheeler, 50 cents; W. B. Eames, 50 cents; Alfred Gray, 50 cents; Whiteker Bros., not entered for award.

PRESIDENT HOLSINGER: The committee on obituaries will report.

REPORT OF COMMITTEE ON OBITUARIES.

The Grim Reaper has thrust his sickle sharply into our ranks since our last meeting, S. J. Baldwin, J. S. Thompson, Doctor Murphy, W. D. Cellar and Geo. W. Tincher having been called from the fading fields of this world to the unchanging springs of eternal verdure. They were worthy laborers with us and earnest in their efforts to make the world more beautiful, brighter and better for their survivors. They were lovers of fruit and flowers and promoters of horticultural art. They are missed, but they have left us the rich legacy and example of lives nobly lived in the interest of their fellow men. We tender our sympathy to the relatives, families and friends of these departed members and coworkers. Respectfully submitted,

A. L. BROOKE,
E. J. HOLMAN,
G. W. COLLINGS,
Committee.

The report was adopted by a unanimous rising vote.

MR. BLAIR: It occurred to me that the resolution before this body, introduced by Mr. Collings, might be referred to the committee on San José scale. You have appointed a committee, or partly appointed it, on San José scale. Why not give this whole matter of compulsory spraying into the hands of that committee, and let us have a law that not only applies to the San José scale, but to other features that are necessary in the spraying. I move that this matter be referred to the committee on San José scale, and that they be requested to give it special attention.

MR. WILLIAMS: I second the motion.

MR. TAYLOR: Now, I hate to antagonize my friend Blair, but I really hope that motion won't prevail. The way to kill a bill is to load it down with amendments; and the way to make a committee ineffective is to give them a lot of things to do. If the San José scale is worth looking after I think it is worth the attention of this special committee, and the general question of spraying I think might well be left to a committee especially appointed to consider that subject.

A. OBERNDORF: I should say that it is more necessary for the state of Kansas to spray for the codling-moth, canker-worm and other insects than for the San José scale. I believe in spraying for the San José scale, but I don't believe it is right to sidetrack the control of the codling-moth and canker-worm for something that is not general over the state, and I strongly recommend that that committee be instructed to look after all insects, and it could all be easily put in the one law without killing it.

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MR. WILLIAMS: Mr. President, I seconded the motion, for this reason: That it is along the line of our legislative work, and we don't want all of the members of this Society upon a legislative committee for the purpose of spending that fifty dollars; and the bill is not yet prepared. These are only suggestions to the committee, and the committee will do exactly what is right. I am perfectly willing to leave all that matter with the committee, and believe the proper place to refer that particular resolution is to refer it to that identical committee.

MR. GRIESA: I think that while this is true, the subject of insects in this state is too general, and I think we should have a law to make spraying compulsory on every man. There are a great many of them that would skip the job; but with the matter of San José scale, that has not been in this state until recently, and it is a matter of much importance to us, with but few trees infected in certain localities, and when it is found if we could get hold of the trees and cut them down and get rid of it, we might be able to control it better than we can by all the spraying laws we can make hereafter. I think we should have a little discussion on this line for the benefit of the committee, so that they may understand to what extent the San José scale is present in this state, and how easily it may be disposed of in that way. It ought to be disposed of, if it is necessary for the trees to be destroyed. Don't wait until the Jan José scale gets all over the state and then go to work and try to kill it. Do it now!

J. W. ROBISON: To appoint a committee is a very easy matter; but to get them to bring about the proper evidence before the legislature that will justify them in doing this is more difficult. It will take effort. I believe our legislature will do what they believe to be right, but this San José scale is distributed much more widely than people are aware of. This matter was recently taken up in the Illinois Horticultural Society, and a committee was appointed to attend to some few miles, and at the last meeting they reported more than 300 miles of Osage infected with the scale. During the holidays I went there and investigated it on forest-trees, on shade-trees, and even in the doorways, and it was spreading rapidly. Now what evidence can we bring before our legislature that will justify them in passing any law and appropriation to exterminate a thing so general as that? How are you going to confiscate a man's orchard or trees? Suppose it is in the case of the hedgerow. Many of the hedgerows are set out in the public highway. You surely would not make a man spend the income from a considerable portion of his farm to exterminate the scale in a hedgerow in the public highway that belongs to the state or county; and, provided that hedgerow was not in the public highway, how easy it would be for the farmer to avoid a heavy tax by getting the commissioners to accept, as a gift, a road along that hedgerow and throw it on the public. There would be no end to the amount of taxation, and I should think it would be very difficult to get the legislature to make an appropriation to meet this matter. If this San José scale is spreading as it is reported by many entomologists, you would have to spray from the Missouri line to the Colorado line. If you can convince the legislature that the money will be properly spent, and that it will be a benefit to the state, then I believe they will make a fair appropriation.

MR. COWGILL: I hope this motion to refer to the committee on spraying will not prevail. The committee on San José scale will have enough to do.

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They have got to convince the legislature that there is danger. It needs no argument to convince this body that there is danger. The great orchards in the Arkansas valley are right in the midst of it. I am glad that Mr. Yaggy will be on that committee, because his orchard is near to it; but don't let us weight that committee down with more things to do before the legislature than they can succeed with. That committee, I believe, can succeed in procuring a measure that will stop the spread and possibly eradicate the San José scale from the soil of Kansas, but there are a lot of other things to do, taking care of the codling-moth, and taking care of the borers and every other pest we have. The legislature is apt to tell you that they have heard about this now and then ever since Kansas was a state and now you are getting in a great stew about the codling-moth. But this committee can say, "We are not talking to you about codling-moth; here is a new infection that is injuring every horticulturist in the state, particularly those interested in the fruit-growing industry, and we want protection from it. Possibly the scale has not spread so far now but that it can be eradicated. Give us the measure and give us means;" and I believe when we do that the legislature will act favorably upon it.

MR. BLAIR: I believe that these gentlemen are right, and I withdraw the motion.

HOW TO GROW ROSES.

By MRS. MYRTLE GREENE, Norton, Kan.

The genuine rose lover will leave nothing undone that will in any way help to improve the growth of the roses. But no one need expect to have fine roses unless willing to take reasonable care of them.

For the benefit of those who love roses well enough to spend a little time and labor, I will tell what I have learned by actual experience in rose growing. First, prepare your rose-bed by selecting a nice, sunny place, protected from the wind as much as possible, but not close to large trees. Plow or spade the ground deep and thoroughly; enrich with well-rotted manure well spaded in. Then select your plants (two-year-old ones are the best) from some reliable florist.

Unless one has quite a large collection it will be best to confine the selection to hybrid teas, as they are hardy, with protection, and bloom all through the season. The very best ones are Kaiserin Augusta Victoria, a beautiful cream; President Carnot, white flushed pale pink; White La France; White Maman Cochet; Pink Maman Cochet, silvery pink, with great waxen stems; La France, light pink; Red La France and Belle Siebrecht, each a deep brilliant pink; Meteor, dark blood-red; Triumph d'Angers, a purplish red; Souvenir de Wootton, dark red; and last, but not least, American Beauty, with its long stems and beautiful foliage.

There are other good roses, but these are the cream of the ever-blooming roses. Have your plants come by the time the ground is warmed up in the spring and dry enough to crumble readily and not stick to the hand. Cut back most all branches, and scrub tops in strong soap suds, to rid them of red spiders, slugs, etc. If planting in a bed, set about four feet apart; if in rows, three feet will do. Set deep in the ground and press soil firmly about roots, using just water enough to moisten the earth about them.

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(Too many roses are drowned in planting.) Then protect with open-top boxes or drive stakes and wrap with papers. Leave for a few days, and when growth begins, if weather is warm, give a good watering.

Once a week, and always before a rain or watering, the ground should be well cultivated, and as soon after as the ground will permit, should be lightly hoed or broken up, as I find it acts as a mulch and prevents the ground from baking.

Cut the blooms before they are fully blown, and cut stems long, and back to a good stout bud, so that the next shoot will be a strong one. After the ground is frozen hard in the winter, set a box with open top over each bush and fill with leaves or well-ripened straw (hay molds). The shade from the box protects from the alternate freezing and thawing which kills so many roses in the early spring.

When the weather is settled and all danger of freezing past, uncover, and cut away all dead wood, apply more well-rotted manure, and cultivate as before. If troubled with insects apply kerosene emulsion after the sun goes down, as if applied while shining it is liable to spoil the foliage.

With this care any one can have armfuls of beautiful roses that will repay a thousand times for the time and labor bestowed upon them.

The Society then joined in the singing of "America," after which the successful fortieth annual meeting adjourned.

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GATHERING BERRIES IN A KANSAS ORCHARD.

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PROCEEDINGS

OF THE FORTY-FIRST ANNUAL MEETING OF THE KANSAS STATE HORTICULTURAL SOCIETY, HELD AT TOPEKA, KAN., DECEMBER 26, 27, AND 28, 1907.

FIRST DAY—AFTERNOON SESSION.

The forty-first annual meeting of the Kansas State Horticultural Society was called to order at three o'clock P. M. by the president, Edwin Taylor.

President Taylor introduced Rev. Charles M. Sheldon, pastor of the Central Congregational Church, Topeka, who offered prayer.

PRESIDENT TAYLOR: The next in order is reports of trustees by districts.

REPORT FROM THE FIRST DISTRICT.

By A. E. DICKINSON, Trustee, Meriden.

A most disastrous year for the fruit grower. Undoubtedly the worst, as a whole, during my experience of nearly forty years in this district.

From reports from Leavenworth, Brown, Jackson, Jefferson and Shawnee counties, and my personal experience and observation, I submit the following report:

Up to early blooming time, which was hastened by warm weather in the latter part of winter, the prospects were, I believe, never better; but continuous cold weather until late in the spring worked almost utter ruin.

Apples, pears, peaches, plums and cherries were almost a total failure, except a very few apples of the very late blooming varieties, like Janet.

Blackberries did the best of all kinds of fruit, yielding from 25 per cent. to 100 per cent. Raspberries, from 5 per cent. to 75 per cent. Strawberries were second to blackberries, yielding from nothing to 100 per cent., according to location and the skill of the grower. Leavenworth county reports that specialists made more money than for fifteen years previous. Gooseberries yielded as much as 25 per cent.; currants, up to 10 per cent.; grapes, from 5 per cent. to 50 per cent., having been frozen back several times.

No complaint this year on account of fungous diseases. A bad year for insect pests themselves; it is to be hoped that the codling-moth is exterminated.

Spraying is not extensively practiced. A wide difference of opinion exists as to its utility. Many believe it to be effective when properly and thoroughly done.

We have the insect-eating birds common to this climate. Some report them increasing; others decreasing. I think the quail is decreasing.

Very few fruit-trees were planted last year and fewer this year. The interest in fruit culture seems to be on the wane.

The universal opinion seems to be that the condition of trees, vines and bushes is excellent at the present time.

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A hopeful spirit seems to prevail among the practical and progressive fruit growers.

Mr. E. J. Holman, of Leavenworth county, had more chestnuts than ever before—over four bushels—that brought fifteen dollars per bushel. He also reports that celery has been profitable; also strawberries, in the hands of the specialists.

REPORT FROM THE SECOND DISTRICT.

By C. V. Holsinger, Trustee, Rosedale.

The climatic conditions of the first and second districts were very much the same. In our particular neighborhood the people who were specializing certainly had their inning this year. The early stuff, such as asparagus and rhubarb, was a good crop, and prices were higher I think than ever before. I know of one instance where one party sold over a thousand dollars' worth of pie-plant off of about one acre. Our good prospects went the usual way along about the 17th of April. But for my own part I was surprised to see how much cold various fruits, after they had formed, could stand. I got up one morning and looked at the thermometer (mine registered 28 degrees) and I thought pears, peaches, plums—everything—had gone the usual way; but I was surprised to see next day how few had been injured, and particularly plums on the lowlands. There was a prospect on the high ground for some peaches and some apples, particularly the York Imperial. Such late-blooming kinds as Jenitons came out after this cold spell, but of course they were all wiped out the morning of May 20.

The strawberries were covered with snow, and the more prolific varieties, the Warfield and Bederwood, gave a good crop. I believe, taking it all in all, the Warfield and Bederwood would average forty per cent. of the ordinary yield. Of course there were not so many berries, but they were large.

As to raspberries, the crop was fairly good. I don't think we had more than fifteen crates of black raspberries on the place. Those that did have them got the highest price I can remember in ten years—four dollars a crate for black raspberries and from five to eight dollars for red raspberries during the season. But in our own case we did not have enough to consider.

Blackberries had one redeeming feature. While the average was not more than fifty per cent. of the ordinary yield, they were fine and prices good. I might add here we had a variety that was comparatively new with us, the Mercereau. They made the biggest yield of anything we ever had in the blackberry line. We had only one row, close to 100 yards long, and we got some fifteen crates off that row, and we figured that it would run about 360 crates per acre. We had none of the Kenoyer or Early Harvest to speak of. We performed a little experiment which we were very much interested in. We covered them with straw in hopes of getting a crop; but they were an absolute failure where we covered them. I cannot account for that unless it was that they were unusually tender, and the cold weather blasted the buds, but at any rate the experiment was an absolute failure.

The grape crop averaged from fifteen to twenty per cent, I judge, in our neighborhood. Where people had not taken pains to trim their grapes they had a big crop, but those of us who did trim were very much disappointed. The first freeze wiped out from forty to fifty per cent. of the new shoots that had grown out. The freeze on the 4th of May killed all that were left, except, I might say, some on high ground. They did grow out, so that we

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averaged fully twenty per cent., except the white grape, the Niagara. The Niagara was the big end of the crop. There were about as many of these grapes on our vines as we ever had. Why it was I don't know, but they made right around 100 per cent. of the ordinary yield.

As to the conditions for the coming year, that question is usually asked. Brother Taylor made the statement at the last Missouri Valley meeting that the prospects were always good at this time (December 26). I can say amen to that.

REPORT FROM THE THIRD DISTRICT.

By F. L. KENOYER, Trustee, Independence.

The past season has gone on record as the most complete failure in fruits of all kinds that the third district has ever experienced. July weather in March and December weather in April proved disastrous to the crop. The orchard that was treated by a burning smudge, the strawberry patch that was hurriedly given a coat of straw, and the tree or vine that was neatly tucked under the carriage robe or bed blanket all met the same fate as the unprotected plantations.

In most sections the tree-fruits were an entire failure, while grapes and berries averaged not more than 15 per cent. of a crop.

A few sheltered localities had considerable fruit of all kinds, but the quality was so poor that it would have been unsalable in an ordinary season. The general failure throughout the Middle West caused what little fruit there was to sell at almost fabulous prices, regardless of quality.

Our present acreage of fruit is smaller while our population is greater than in most of the districts of the state, which makes fruit growing remunerative even in a year of great shortage. The shortage in fruits made an increased demand for tomatoes, corn, beans and other vegetables for canning and pickling, to take the place of the usual supply of canned and preserved fruits. The horticulturist who was versatile enough to take advantage of this condition was not so badly hurt by the loss of his fruit crop.

We have had a poor season for plant growth and nurserymen are not very well stocked with trees and plants for the spring trade.

Old berry fields are in good condition for next season's crop, but many of the new fields are not very promising on account of poor growth and thin stand. Raspberries are the freest from anthracnose that I have seen them in ten years, and strawberries are unusually free from leaf blight. Blackberry rust is giving considerable trouble on all late varieties.

Fruit-trees and vines are in good condition. The prospect for a full crop of all kinds of fruits is fully up to the average.

REPORT FROM THE FOURTH DISTRICT.

By C. C. COOK, Trustee, Eskridge.

The report from the fourth district must be brief, as everything in the shape of apples or stone fruit was frozen out; could hardly be otherwise when it frosted and froze fourteen times after they began to bloom, from April 1 to May 15, to wit: April 1, 30°; April 12, 23°; April 13, 23°; April 14, 23°; April 16, 25°; April 17, 25°; April 19, 28°; April 20, 31°; April 26, 28°; April 29, 31°; April 30, 28°; May 3, 28°; May 4, 27°; May 15, 30°.

And after all this freezing and frosting there were many apples set on the York Imperial, Rome Beauty, Janet, Smith's Cider, Winesap, and several of the summer varieties, to be killed later by the codling-moth. I had a few York Imperial to mature, and some Sweet Bough.

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No peaches, pears, plums, apricots or cherries matured, except three peaches on a seedling.

Strawberries were 25 per cent.; Lucretia dewberries, 75 per cent.; blackberries, 50 per cent.; grapes, 10 per cent.

Condition of trees at the present time is not very good; in many orchards, where trees were not trimmed or cultivated, many have died and the fruit-buds are weak.

Orchards that were cared for are in fair condition. All trees and vines have made but a slight growth.

REPORT FROM THE SIXTH DISTRICT.

By J. J. ALEXANDER, Trustee, Norton.

The year 1907 commenced with very flattering prospects, but the months of February and March were very warm; the mercury raised to ninety-two degrees in the shade, and trees and shrubs came out in splendid shape. The prospects for a fruit crop were never better; every tree of bearing age was in full bloom from twenty to thirty days earlier than in ordinary years, and it bid fair to be the largest fruit crop the sixth district had ever had; but about the 10th of April it turned cold and we had very heavy frosts that killed all the bloom that was out. The trees continued to bloom, and it continued to freeze until all the buds were opened. The last freeze came on May 27; this was a pretty hard freeze. Up to this time the cherries and plums had not all been killed.

The trees bloomed to all appearances for the fourth time, but of course it was the late buds. Up to the 27th of May there was some fruit left on the lower limbs. The Janet apple was the last to go, and the Elwood and Wolf were the last to go of the plum family. All of the Japan varieties went first; in fact, they have proven too tender and too early in bloom for our part of the state—I mean the Burbank, Wickson, Abundance, and Red June. I have tried all these varieties and they have failed; but all the European and American varieties will succeed in the West. This year all failed. I do not think there was one single basketful of fruit raised in the sixth district. The peaches all went. The Alexander, Crosby and Champion were the last to give it up. The cherry—the Richmond and Montmorency are our standards, but all of the Morello type are hardy; some are better bearers than others. We had some grapes and strawberries, but none worth mentioning. The grapes came out and were frozen back three or four times; when the vines did grow there were a very few backward buds that came out and bore some grapes, but nothing like a crop. The strawberries bore just a few berries. Altogether, after the freeze in May, things looked very discouraging until the middle of June. The freeze in May killed all the leaves, and the trees looked like winter. After the middle of June the trees put on some growth, but hardly as much as an average year.

We have had a very dry season except in small localities. The rainfall has not been distributed very evenly over the sixth district. The rainfall has been about 14.86 inches. The south and east part of the district has had more rain than the south and west part, the rains being very local. The trees have gone, nevertheless, into winter well matured, and the fruit-buds are in fine shape at this time, the 23d of December, but the buds are not as large as they would have been had there been more moisture. Yet the prospects are good for a fair crop next year, if nothing happens to kill the fruit-buds, as there did last year.

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There is good ground for hope that we may have a good fruit crop in 1908, and that we may profit by our failure in 1907; and let us try to believe that it has been for our good, and leave results to Him who doeth all things well, and we should appreciate what we have and call it good.

REPORT FROM THE SEVENTH DISTRICT.

By C. A. BLACKMORE, Trustee, Sharon.

The general condition of the fruit in January, 1907, was excellent. The spring was very promising, as every fruit-tree and vine was full of blossoms. Never had such a crop of fruit set on all varieties and all kinds. But, alas! it began freezing the latter part of May, when cherries were the size of peas, and apples, apricots, peaches and plums were the size of birds' eggs.

The freezing continued until the fruit was all killed, and the garden vegetables as well. Even the twigs and small limbs of the forest-trees were killed; and yet we had some fruit. A very few apples, a fourth of a crop of Wild Goose plums, 25 per cent. of a crop of blackberries, dewberries, raspberries and gooseberries. Grapes gave only 15 per cent. of a full crop. There was no rot, rust or fungous diseases this season.

The writer believes the complete failure we had the past season to be a blessing in disguise, as most fruit-trees were full of decayed fruit from the crop of 1906; and this failure has been a check to insects and fungous troubles.

Spraying is not practiced as it should be, except by a few of our best horticulturists; with them it is a success.

Insect-eating birds are increasing where protected; mocking-birds, doves, quail and other birds are quite plentiful, and the redbird is making his appearance. The amount of fruit destroyed by birds is very small compared with the amount of good they do.

Tree planting is at a standstill. Some orchards are being neglected, and some are even digging up young orchards just coming into bearing.

The people are not taking the interest in orcharding or horticulture that they once did. This means more profit to the man who properly cares for his orchard and his fruit.

Fruit-trees and vines have gone into winter quarters in the best of condition.

There is much planting of forest-trees. More catalpa, Black locust and mulberry are being planted than ever before.

REPORT FROM THE EIGHTH DISTRICT.

By GEO. A. BLAIR, Trustee, Mulvane.

The general condition of fruit-buds and trees in January, 1907, was good throughout the district, and also in the spring. There was a full crop of blossoms and, with a few exceptions, a good crop of fruit was set.

In and around Augusta, Butler county, the fruit was killed in the bloom. There were absolutely no apples, pears, peaches or plums picked within the eighth district.

At El Dorado, Butler county, there was a one-fourth crop of cherries. Blackberries yielded a fourth of a crop in Sumner county, a half crop in Sedgwick county, from one-tenth to one-half crop in Butler county, from one-half to 60 per cent. of a crop in Harvey county.

Raspberries gave a fourth of a crop in Sumner county, a one-fifth to a one-fourth crop in Butler county.

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A fifth of a crop of dewberries was picked in the vicinity of El Dorado, Butler county.

Strawberries gave a one-fourth crop in Sumner and Sedgwick counties, and one-third of a crop in Harvey county.

There was a one-fourth crop of gooseberries picked in Sumner and Butler counties.

Grapes were frozen back two and, at some places, three times, yet the reports received show from one-tenth to one-half of a crop in McPherson, Sumner, and Sedgwick counties, and one-fifth to a half crop picked in Butler county.

There was some blight throughout the district. In Sumner and Sedgwick counties there was considerable mildew on roses, and also what appeared to be mildew on the apple leaf. The canker-worm devastated the orchards in Butler and McPherson counties. The leaf-roller was also reported at El Dorado, Butler county.

Mr. Yaw, near Wichita, reports the curculio living on the plum, peach and cherry leaf, and exhibited at the December meeting of the Sedgwick County Horticultural Society specimens caught from the trees this season. He predicts the bark beetle will kill 50 per cent. of the cherry trees in his vicinity.

Spraying is practiced more in Sedgwick and Sumner counties than elsewhere in the district. It is here considered a successful protection. In Butler, Harvey and McPherson counties it is but little practiced and is not considered much of a protection.

Insectivorous birds are thought to be increasing in Sumner and Sedgwick counties, and are protected by the orchardists there, while in Butler, Harvey and McPherson counties there is no marked increase and they are but little protected.

Harvey county reports a good many fruit-trees planted during 1907; in the balance of the district a few have been set. The people in Harvey county, and in and around Wellington, are taking greater interest in horticulture than formerly.

The condition of trees, vines and bushes for entering the winter of 1907–'08 is reported good all over the district. The interest in forest-tree planting is slight; but few forest-trees were planted in 1907.

The frost and hard freezes throughout the district are responsible for the most complete fruit failure we have ever had. The principal damaging freezes occurred on April 12, 16, 26, 30, and May 3, 4, and 15, spring of 1907.

Various opinions have been expressed concerning the results. Some of the most hopeful pronounce it a blessing in disguise, as they assert it will starve out the codling-moth and curculio.

PRESIDENT TAYLOR: You have heard these reports. What will you do with them?

MR. DIXON: I cannot allow the reports to pass without saying a word about the weather panics we had in the spring. I say weather panics, because one continued after another. I had an idea that we were going to have a slight frost in the spring, so I prepared for it a little, and had some experience that was worth something to me, and if the cold weather had not continued so long I think I would have done some good. The benefit that I experienced in the strawberry field was by irrigation. You will remember

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that we had a very dry spring, and for two weeks before the lowest frost, on May 25, we had been irrigating and running our pump day and night; and we had been practicing another method, too, and that is smudging. The strawberries began to bloom about the middle of May, and we smudged every cold night, and we had no damage from frost. The night of the 26th was Sunday night, and our men were not working during the day. I never dreamed that the thermometer would go so low as it did. The thermometer stood at 49 degrees in the evening. The next morning it stood at 28 degrees. Our strawberries were in full bloom, and all the blossoms that stood up were killed, and especially where they were unirrigated; but where the plants were thoroughly irrigated, and wet, the damage was very little, and if I had smudged that night I am sure we would have had no harm at all. The cold nights we had had before showed no damage when we smudged.

A neighbor not a mile away did no irrigating and his strawberries were damaged, and on the night of the 26th all his strawberries were killed. Our irrigated field yielded an average crop; the field that we had not irrigated, nothing, as far as profit was concerned. Four acres of them were almost a total failure because the ground was perfectly dry; on that four acres we had irrigated the week before, and had it not been Sunday night we probably would have been at work, and probably would have done a lot of good. I have no theory to advance why the irrigated berries were not damaged. Well, I have one notion. I guess the fruit grower would not be a fruit grower unless he had a theory about things. I had a notion that there were two reasons why the strawberries were not damaged where they were irrigated. The foliage was much taller, and helped to protect them, and then the moisture in the soil may have helped. I know we had the strawberries, anyway.

MR. ALEXANDER: I think Mr. Dixon probably is honest in his theories all right about his work, but had the mercury gone as low with him as it did with us he would have been praying for dry weather. Out in our district it froze ice almost an inch thick on the night of the 27th of May, and if it had been wet I don't know how deep it would have frozen. I think my plants would have all gone if it had been wet.

EDWIN SNYDER: The theory of Brother Dixon is all right. There is a great deal of latent heat in water. Now, in the peach regions of Lake Michigan the lake freezes out about seven or eight miles from the shore, and does not freeze any further; from ten to twelve miles inland the mercury hardly ever gets to zero or below it, and they nearly always have a full crop. They have the protection of the adjacent water. About the Japanese plum: I have had them for ten years and never had one crop.

A MEMBER: I would like to have Mr. Dixon explain his smudge.

MR. DIXON: As I said before, I had a little warning that we were going to have a freeze, and I made elaborate preparations to smudge everything on the farm. We had a few barrels of oil, and we had hauled in the neighborhood of 100 loads of stable manure. The first three nights (I did not suppose it was going to continue all summer) that we smudged in April, we could see very little damage in our peach and apple orchards. The peach trees did not seem to be damaged very greatly, but the long-continued freezes finally got away with them. We could not keep up the smudge; it took too much work. In our strawberries we did not need this smudge until

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in May some time. The frosty nights on which we used the smudge there was no harm done to the bloom. It is easy to tell damage to strawberry blossoms. Just as soon as the sun comes up you can see the damage in the strawberry field.

A MEMBER: Mr. Dixon hasn't explained his method.

MR. DIXON: We put piles of straw manure around our strawberry fields, and kept a few loads on wagons, and if we run out of smudge we could just hitch up a team and haul as much manure anywhere as we wanted. A good quarter wagon-box full will run a smudge three or four hours. We used mostly the straw manure, and it did lots of good in the strawberry field.

A MEMBER: Did you put oil on these?

MR. DIXON: We used the oil in our experiment as much as anything. By using the oil a heavier smoke is made and it doesn't seem to drift so much. We had so much smoke that the town of Holton woke up in the night and thought the whole town was on fire. Sometimes the wind would shift a little and the smoke would drift back and forth across the field; we had to lie down on the ground sometimes, the smoke was so dense. When the wind blows a little you do not suffer much. Whenever it comes one of those dead, still nights, the smoke will settle, and it is surprising how thick it can be made. I am satisfied it does good, and I am going to try it again next spring.

A MEMBER: At what time in the night did you commence this smudge?

MR. DIXON: Our strawberries were just commencing to bloom on the 14th of May. We commenced the smudge-fire that night as soon as the thermometer got down to 36°; but on the 26th, when it was only 28°, our strawberries were all destroyed where they were not irrigated.

PRESIDENT TAYLOR: Brother Blair wants to know how you worked your oil.

MR. DIXON: I just poured it on the manure and trash.

PRESIDENT TAYLOR: How much?

MR. DIXON: I just used what I wanted to; poured the oil on the pile, which made it last longer and made a more dense smoke.

MR. SNYDER: Mr. Dixon did not give us the theory of the smudge. The theory is that it formed a light cloud, and frost never falls where there is a cloud. It is the practice at Grand Junction, Colo., and also in the vineyards of France, where it has been practiced for centuries, and they use their oil on litter and stable manure, or something of that kind.

MR. DIXON: That is the theory exactly. It was a bright moonlight night, yet we could not see the moon because of our smoke.

MR. BLACKMORE: I want to inquire where Brother Snyder lives?

PRESIDENT TAYLOR: He lives in Jefferson county.

MR. BLACKMORE: Well, he is condemning Japan plums. It is the only plum that we have had that is worth growing. I live in Barber county.

MR. ROBISON: I would like to give a little experience of one of my neighbors with the smudge. He had a very nice forty-acre apple orchard in the low bottomland, and he thought that he would try an experiment with the smudge, and he smudged three different nights when there was danger of

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frost, and saved his fruit. The next hard freeze came, and he started to smudge again, but he found that the fruit was already frozen, and he gave it up, and did not gather any apples off that forty acres. It might be, if the frost had stopped with the three nights, he would have saved quite a lot of fruit, and if that fourth night had not come he would probably have thought the smudge just the thing exactly.

MR. ALEXANDER: I don't want Mr. Blackmore to think that Brother Snyder and I are condemning the Japan plum for all localities. In my locality (Norton county) it is a failure. It blooms early in the spring; it is a tender tree. It does not give me any profit. Now it may be down in his country he has a different altitude and different surroundings, and that it will succeed there. I would not condemn it, gentlemen, because it is not a success with me or Brother Snyder.

A MEMBER: We find if we can get land wet for common plants that we seldom lose by frosts, especially cabbage plants and such as that. Take it when the ground is dry, the frost goes much deeper than when it is wet.

MR. W. H. BARNES: The theory obtains that wet freezing is worse than dry freezing; that things must be dry if they will not be frozen, but my experience has been different. I recollect one time I had several acres of cabbage, and the weather had been exceedingly dry, and it had not headed out as it ought to, and cabbage will grow clear up into December if the weather is good. It depends entirely on whether frost strikes it when it is dry or when it is wet. I want things wet when they are frozen, as far as the vegetable line is concerned, and I think so in most of the fruits.

MR. WILSON: I noticed in two of the reports the statement made—or at least we were to imply from the statement made—that the codling-moth was wiped out of existence, and we need not fear it much the coming year. I have been expecting somebody to take notice of that part of these reports. I would like to know if it is the sentiment of this Society that the codling-moth is a thing of the past.

PROFESSOR DICKENS: I know our entomologist has been having considerable correspondence concerning this matter, and in conference with him he told me that it was the opinion of most entomologists that codling-moth eggs would be left over, and they have, I believe, identified this egg on the leaves, and have even identified some of the moths. I might say, in that connection, that most of the men who have been fighting fungi and insects will have the fungi to fight anyway. I believe our largest apple growers, who have been spraying, will continue to spray and take precaution to keep the codling-moth down while they have a chance. In Reno county, I think in 1903, they had almost the same conditions; they had practically no apples. The next year I think they had the finest crop of apples ever grown in this state, a large per cent. free from the codling-moth. I counted a good many apples in the sheds that fall and found only four per cent. of codling-moth larvæ. The next year they had a pretty fair crop of codling-moth. The next season they had the normal. And this seems to be the history of most of our insect pests; if we have a disaster from a physical standpoint which in any way sets back the numbers, for a time at least we are comparatively free from the insect. There is no question but what there will be fewer codling-moths next year.

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MR. WILSON: How about the curculio?

PROFESSOR DICKENS: I have had a good deal of inquiry about that insect. I am not sanguine enough to believe that we are entirely free from any of these insects.

A MEMBER: I rather think most orchardists will find themselves in the fix I am in. I had nearly everything frozen, but I had a few Jeniton apple trees which were the latest to bloom of anything that I grow. Now, those trees set a little fruit, but it was so poor that I abandoned the trees. Those apples certainly entertained some of the codling-moth; so I don't believe it is a safe proposition to argue that, inasmuch as we have had a killing frost on fruits, that it is going to kill these insect pests off entirely. I believe that the safest way and the most business-like way would be to spray with the same persistency as if we had had an enormous crop. I think in that way you would certainly have something next year to brag about.

MR. ROBISON: I would like to ask Mr. Dickens if he does not think there is strong probability that the codling-moth and curculio, both of which were found living this season, will not live and carry themselves through this season. I have heard of a few apples in town, under very favorable circumstances, that did grow and mature, but out through orchards fully exposed I do not think there was a single apple, plum, pear or peach matured. Now, is it possible that those insects can breed and carry themselves over without fruit? If we were further north, near some place where the hawthorn thrives, they could carry themselves over in some numbers. But we have no fruit of that kind here that I know of, and it was a question with me whether they could survive without fruit at all.

PROFESSOR DICKENS: It is probable that some few will survive. I might say that in the Kaw valley, at any rate, the hawthorn is fairly well distributed. There are three species. I did find one or two trees of haws that had considerable fruit on. Regarding the matter of apples, we had considerable fruit on some trees. Mr. Westgate, near Manhattan, picked thirteen bushels of Jeniton apples this year, and they were pretty well infested with codling-moth.

MR. MINER: I have taken the ground all the time that as we are in Reno county it is not necessary to spray this year. The frost last year destroyed everything—apples, peaches, pears, plums. We had a very few strawberries, and a very few blackberries. Under those conditions I have maintained that the codling-moth is exterminated; that they have no home. I asked Professors Popenoe and Hunter for their opinions, and they both advised me that there would be some codling-moths, and we had better spray. The professor said it was possible to mature the worm on the leaves. As I have said, we had a complete wipe-out; in that section the frosts took absolutely every apple we had in the county. We have some fungous growth and some bitter rot that it is necessary to spray for. We are sprayers down there. We don't want to run any risk at all about losing our crop another year. We have our poison. We are all ready to go ahead if necessary. I will say that I think a majority of persons are going to spray, and I think the majority are going to put some poison into their Bordeaux.

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President Taylor appointed the following committees:

Committee on Credentials: F. W. Dixon, Geo. A. Blair, B. F. Smith.

Committee on Audit: J. B. Fergus, F. L. Kenoyer, A. B. Smith.

Committee on New Membership: J. L. Williams, A. E. Dickinson.

Committee on Obituary: Francis Goble, Geo. W. Holsinger, J. J. Alexander.

Committee on Resolutions: J. T. Tredway, Edwin Snyder, G. L. Holsinger.

REPORT OF SEDGWICK COUNTY HORTICULTURAL SOCIETY.

The Sedgwick County Horticultural Society was organized February 13, 1904, with about fifteen charter members. The first year it was not very well known through the county, but since then it has grown steadily and has at the present time 116 members. Meetings are held the first Thursday in every month; in town in the winter, and all-day picnics at the homes of various members in the summer. Meetings are well attended and the programs are interesting and instructive, with papers and discussions on all subjects of interest to horticulturists.

Good work has been done by the Society learning to know, and calling general attention to, the various insect pests and enemies of fruit and finding best remedies for the same.

Officers for 1908 were elected in December, and are: President, G. W. Collings; vice-president, Thos. McNallie; secretary, Maude E. Wickham; treasurer, F. E. Wickham; prompter, Frank Yaw.

OBITUARY RESOLUTIONS.

PROFESSOR ELBRIDGE GALE, the subject of this sketch, was born at Bennington, Vt., December 25, 1824, and died November 5, 1907, at Mangonia, Fla. In his youth he attended the common schools at the place of his nativity, Bennington, Vt., and, later, Brown University. He afterwards became a student and graduated from the Baptist Theological Seminary, at New Hampton, N. H.

At Johnstown, Vt., in 1853, he was united in matrimony with Miss Elizabeth Carpenter, who died at West Palm Beach, Fla., in 1893. Professor Gale came to Kansas in 1864, and, being much of a horticulturist by nature, was elected president of the State Society in 1874, which position he filled faithfully for twelve consecutive years. In the later '60's, however, he was elected to the position of professor of horticulture in the Kansas State Agricultural College, which position he held for many years.

Professor Gale has been an honored and very beneficial member of our Kansas State Society; and be it

Resolved, That we, the members of the Kansas State Horticultural Society, do hereby extend our heartfelt sympathy to the bereaved relatives and friends.

Resolved, That the secretary be hereby instructed to forward to the bereaved friends an authentic copy of these resolutions.

WILLIAM PLASKETT was born in Indiana in 1824; from there he moved to Mount Pleasant, Iowa, and in 1869 to Baldwin, in Douglas county. Here

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he did a small nursery business, and planted the trees in the park around Baker University. It was largely through his efforts that Baker University was saved and became a permanent institution. For some time he was a trustee of this university.

He moved to Lawrence in 1887 and established a nursery, in which business he was engaged for several years, finally giving up his active nursery business for fruit growing. He died at his home in Lawrence, in the early part of December, at the ripe age of eighty-three.

He was a member of this Society for several years, and his absence from the meetings will be much regretted by the members.

FRANCIS GOBLE,
GEO. W. HOLSINGER,
J. J. ALEXANDER,
Committee.

PRESIDENT TAYLOR: It is necessary for us now to pass on, if we follow our program. The next number here is communications. Are there any communications for the Society?

J. W. ROBISON: Before we pass from those reports I move that they be accepted.

The motion was carried.

Secretary Wellhouse read a number of letters, and was instructed to make suitable replies to all communications.

PRESIDENT TAYLOR: The next number is a paper on "Cherries," by A. B. Smith, of Topeka.

CHERRIES.

By A. B. SMITH, Topeka.

This subject could be elaborated as broad as the world is wide. We are not ambitious, however, at this time; therefore, we will confine our remarks more especially to our own country, and most particularly to our own locality.

The cherry belongs to the family of stone fruits. It is a prolific bearer where conditions are favorable, and twice a year it invites pleasant comment to all who behold its wealth of snowy beauty in springtime, or later its bounty of gay fruitage nestling amid a foliage of the richest green.

Cherries are divided into two distinct types, both as to tree and to fruit. We may safely treat them as the sweets and the sours. The tree of the sweets is habituated to a compact, erect growth, somewhat subject to disease and early mortality. The tree of the sours is low-headed and spreading. Certain varieties of this sort are good bearers and stay in business from twenty to thirty years. Sweets are much sought after by *birds* as well as *people*, with the result that much of the fruit has been claimed by bills presented and collected promptly in spite of protest. Sweets are not generally cultivated in large blocks in the Mississippi valley. They are confined to dooryards and by-places about the home, while the sours are raised to some extent, commercially, in New Jersey, New York, Pennsylvania, Michigan, Ohio, Indiana, Kansas and Nebraska. The tree grows to mammoth proportions in some parts of Europe and on our eastern coast in the latitude of Maryland. The Japanese cluster some pretty sentiments about the cherry; what they are I cannot tell—"the lid is on."

Mazzards (inferior seedlings) are found to be the best stock for both

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sweets and sours in the East, where moisture is more in evidence. In the West the Mahaleb stock is perferred, although in the choice of the West there is some sacrifice results in root system, union and longevity of tree. The Hardy Mahaleb seem better fitted for the dryer and more strenuous life of the plains.

Formerly the Morellos were in great demand, but of late years the Early Richmond has become the most widely favored, while the Montmorency, or Late Richmond, probably stands the second in choice.

Insects are not seriously troublesome to either tree or fruit, locally speaking. The curculio puts on his cresent-shaped stamp now and then, but this is a circumstance that pertains more especially to the Morellos. It is a curious fact that such stone fruit as the plum, apricot, peach and Morello cherry, about in the order named, should be punctured so relentlessly, while the Early Richmond and the Montmorency should escape almost without harm. The only thing I have found to contend with that called for the suspicion of disease is a disposition towards what is known as brown rot. This occurs only when the weather is wet or sultry and the cherries are hanging on the trees after they have become fully ripe.

Cherries are expensive and are not adapted to a distant market that is several days away. Perhaps this is the reason they are not raised more extensively on the Pacific coast, where they grow in certain limited areas with most gratifying success. Cherries do not thrive well beyond a certain limit of latitude, either north or south. The states we have already named, in connection, will favor the presumption that Kansas is well located in this respect. An ideal condition for growing cherries for profit would probably be, a climate where the springtime is marked with abundant sunshine and sufficient moisture; the latter part of summer and fall dry; the soil good; the land so situated as to be always free from water clog; cultivation during the months of April and May only; selected scions of the varieties early Richmond and Montmorency, with a ratio of five of the former to one of the latter; scions placed on non-sprouting stock; trees set twenty-five feet apart each way, planted never as deep as the crown; 500 to 1000 trees adjacent to a good-sized town, with railroads reaching other near-by towns; a party in charge who is thoroughly interested and having five years of patience; then plenty of good step-ladders, and girls and women to use them. Results: Satisfaction every year except 1907 and its duplicates, barring cyclones and a future that refuses to give up her secrets.

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EVENING SESSION.

THURSDAY, December 26.

The meeting was called to order at 7:50 P. M. by President Taylor.

PRESIDENT TAYLOR: We will be welcomed to the city by General Hughes, in the absence of Mayor Green.

ADDRESS OF WELCOME BY GEN. J. W. F. HUGHES.

Mr. President, Ladies and Gentlemen: I don't know but that it is peculiarly fortunate for me to personally appear to-night, inasmuch as I am that unfortunate creature that sort of roused you out of your old office. I want to sort of square myself. I want to tell you that, outside of the "war department," the most important department in the state of Kansas is the State Horticultural Society.

Topeka is always glad to see you. Don't you know that every one of you own this town? It belongs to you. You own the capitol and everything in it, and if it was n't for you people that come here and spend your time and talents with us, we would not have any city of Topeka, the town that is the best city in the state, and in the best state in the Union. The city of Topeka is always glad to meet the Kansas State Horticultural Society. We are only sorry and regret that you have n't a larger attendance. Of course we realize in Topeka that it has been pretty hard to put up the expense. Pretty hard, indeed, because of the extraordinary slimness of the apple crop in this state. We regret that your fruit crop was not larger, but we are grateful to you Kansans for coming in here regardless of the quietness that hovered around your orchards last fall. More quiet, indeed, for you than us. Topeka always has a warm spot for any of the state institutions that meet here, and we not only hope that the supreme court room will not be large enough, but that hereafter you may have such an abundant crop of peaches, apples, and all those things, and that so many may attend your meeting that the Auditorium, with its 5000 seating-capacity, will not be able to hold the State Horticultural Society. We are only sorry you did n't bring your wives with you. We are exceedingly glad to have you with us.

RESPONSE OF PRESIDENT TAYLOR.

The General is the very man who got the lovely rooms they turned us out of, and we certainly did feel kind of hard toward him, but in the warmth of his welcome he has certainly turned the tables on us—poured coals of fire on our heads, as it were.

We have been coming up to Topeka for a good many years on these annual pilgrimages, and I do not recall that we ever failed to have some representative citizen give us the glad hand. The sentiments of cordiality that have been expressed by General Hughes we have heard with pleasure many times before.

Those sentiments we heartily reciprocate, and the interest that has been expressed from time to time in our line of effort will stimulate us the more to persevere in our chosen vocation, whether the returns are large or small.

I think it is violating no confidence to say that the returns were not par-

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ticularly encouraging the past year. Perhaps another season will see some improvement. Conditions at the present time are favorable. I suppose a fruit grower's prospect this time of year is n't much more valuable than a miner's prospect any time of year; but, whatever it is worth, our prospect now is for plenty of fruit another summer.

We are come up to Topeka, General, in part to tell the city folks this good news; in part to see the sights of the capital, including a look at the curiosities of "Copeland county"; and in part to refresh ourselves with two or three days' intercourse with the brethren.

It used to be charged against us that when we came to Topeka we wandered around in groups as if we were afraid of something. Well, the fact is, we were. In the back districts we have to be on the lookout for varmints of various kinds, and we had heard so much about the Topeka "b'ars" that we were on the lookout for them! But now I am told that the Topeka bars are exterminated and the danger from them is gone. In behalf of the Society, General, I want to thank you, and all others who had a hand in it, for driving the "b'ars" away—to that extent, at least, making Topeka a safe place to visit! While we are here we want to call on "Young Hickory," General Jackson. Some of us hold in deep reverence the memory of his uncle, "Old Hickory," "The Hero of New Orleans." Their relationship I am just guessing at, but the young general has the same compelling way as the Old General, and they might be "kin." We would like to say to the general that an officer of his caliber, one who like himself has been able within a year to corral half a dozen millionaire brewing corporations, and dehorn them and run them across the state line—that that kind of a candidate for reelection has nothing to fear from a primary-election law.

And then while we are here we want to go and call on the governor. We want to congratulate him on that center shot of his. The story is out, down in the rural districts, that if the governor had not borne down heavily on the Board of Railroad Commissioners they never would have put in the two-cents-a-mile rate. They also say that when the order was made the railroad attorneys just smiled at each other until the governor gave them twenty-four hours in which to make the order effective or prepare to have the legislature unchained. That is what I call being "governor."

I think I can speak for the whole Society when I say that we have never favored rates that were not compensatory to the railroads, nor have we regarded the amount of the rate as equal in importance to equal rates. But it did make us mad, General, when our poorer members, driven by the law of necessity and the law of the land, had to pay three cents a mile for what our rich members got for two cents a mile. I don't know that I speak for all, but there are some of us who, in view of the fact that the railroads in answer to that two-cents-a-mile order, or in retaliation for it, are taking off their trains and making people walk, would like to ask the governor why the time is not fully come for him to call on the legislature for help to make the roads restore the abandoned trains or else stand out of the way and see the state of Kansas run their cars.

The word "horticulture" has been turned away, in part, from its original significance. With many people, now, it means the "Big Red Apple," and its cultivation in orchards so extensive that it takes the ability of a great general to handle one and a bank to carry its paper. But it seems apparent

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that when any kind of fruit production passes over into a capitalistic enterprise, it loses its hold upon that "culture," whose very name—"*Hortus*-culture"—signifies the limitations of a garden.

We are proud of our millionaire apple growers, but, after all, our main consideration and concern run to those nature-lovers, in town and country, who find pleasure and profit in adapting the gardener's gentle arts to the ministrations and adornment of their homes.

The response of President Taylor to the address of welcome was followed by a song by Mrs. B. B. Smyth.

The next paper on the program was "Care and Treatment of Bearing Orchards," by W. H. Underwood, of Hutchinson, but as Mr. Underwood was not present, the paper was read by Secretary Wellhouse, as follows:

THE CARE AND TREATMENT OF ORCHARDS.

By W. H. UNDERWOOD, Hutchinson.

I am very loth to lay down any specific treatment under this general heading, as I have seen orchards this past fall in Arkansas, Idaho, Washington, and Oregon, also in the Grand Junction district; and I must admit that the treatment that seems to be a success in one place is apparently an absolute failure in another district.

In Washington they seem to raise as fine apples without irrigation as they do in other districts of the same state with irrigation. As far as the soil-treatment is concerned, I believe that the orchardist on heavy land must cultivate thoroughly. Our own treatment here in Reno county, on very sandy soil, at the foot of our sand-hills, is to let the ground alone after the orchard comes into bearing, mowing the sunflowers and grass and weeds two or three times through the season, and allowing them to lay on the ground as a mulch. Up to the present time this treatment has been all that could be desired, as we have raised very large and fancy crops for the past three or four years, barring this one, or, in other words, during the bearing period of this young orchard.

I believe that we made a mistake, in growing our orchard, in cultivating this light sandy soil too much. We kept the ground absolutely clean for the first seven or eight years of growth, and we did not raise an apple, except on a few Missouri Pippin trees. We had great, big, fine-looking trees, and they were similar to a lilac bush, having so much wood growth. We then woke up to the fact that we were raising wood instead of apples, and that winter we cut out what I estimated was fifty per cent. of the wood growth, and the following year we grew fruit-buds on these trees. Since that, for the past five years, we have been gradually taking out wood and cutting them down, so that they look a little more like trees in the West; that is, with three or four main branches instead of a dozen, as we had.

As we thought this severe pruning would throw the trees out of balance and not give us the crops, we haven't taken out as much any one year as we wanted to, and are still pruning out the heavy branches, and expect to for the next two or three years. After that time we hope to have the trees in such shape that we can get along with simply rubbing off or pruning such water-sprouts as develop.

I will state here that we have been rubbing off water-sprouts and clip-

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ping them when they get older for the past three years. On account of our orchard being large we have not been able to hire men enough to do this work in May and June, when we wanted to, and have had to continue it all through the season.

We started spraying in rather a haphazard and loose way four or five years ago, and did not get down to business until two years back. Previous to that time most of our crop contained codling-moth and stings from different insects, and there was not very much profit in the business, as we sold poor fruit, and you know the market is always glutted with that variety.

We are now spraying five or six times per year, and since we have been spraying as often as this and doing what we believe is right we are raising fancy fruit only. Our No. 2's and culls are almost a thing of the past. For this fancy class of fruit there is always a market and we do not have to compete with any one.

As we have very little fungus in this country we have only sprayed twice during the season with Bordeaux, adding the arsenate of lead to the mixture each time. The balance of the spraying has been done with arsenate of lead only, and we have sprayed with Bordeaux as a preventive. This year, just now, we are preparing to spray with a double-strength solution of copper sulfate the first few open days we have, and we expect that this one spraying through the winter, which we can do at less expense and put it on stronger, will do for the season, and that next spring we will only have to spray with the poison. This will relieve us of a great deal of work in mixing and the chances of scalding the leaves with the Bordeaux.

Anything that we can do to facilitate our getting over the orchards quickly in the spring and summer we believe is that much gained, as we want to get over the whole orchard in five or six days, so as to get the moths in the right stage, instead of waiting until they get into the apples.

We watch the development of the moth on a few trees near the house, and as soon as we find twenty-five per cent. have flown, we figure to spray in seven or eight days. My opinion at present is that the whole care and treatment of a bearing orchard can be summed up as follows: If you have heavy ground, cultivate it; and, whatever kind of ground you have, prune thoroughly and spray on time. And we think that with this treatment any one will raise apples.

PRESIDENT TAYLOR: It gives me pleasure to have the opportunity to introduce Dr. C. W. Burkett, of the State Agricultural College, who will now address us.

SELECTION AND CARE OF SOILS FOR FRUIT GROWING.

By PROF. CHARLES W. BURKETT, Manhattan.

Mr. President, Ladies and Gentlemen: I am very glad of this opportunity of meeting with the horticulturists of the state to discuss a subject that to me seems the most important of all before the man who deals with the orchard, with the garden, or with the farm. Now, we have several agencies for the promotion of the horticulturist. This organization stands for the promotion of the horticulturist from the business standpoint: from the standpoint of the man as a general citizen of the state. The Agricultural College stands for the promotion of the horticulturist, in giving out new

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ideas and new ideals that contribute to a greater profit and prosperity for this line of work. And then we have the Experiment Station, which stands for the promotion of research as applied to all phases of agricultural activity. I am happy to say that in our college and experimental work one of the best-organized departments that we have is that which concerns your work, and one of the most enthusiastic men that we have in our body is working on these lines in which you are interested.

And then we have another agency for the promotion of agriculture in general, or another agency that should be directly concerned and connected with the things bearing on the farm. It is the rural school. The rural school stands for the training of young people in their work. I fear that the rural school is just about lost if it is not redirected. There is a redirection of agriculture now taking place all over the country. We have in a certain measure redirected our Agricultural College, because they did not see or did not know very much about training the young for activity on the farm. That redirection has been going on for some time now. We have been redirecting various lines, but we are now undergoing the redirection of the rural school. We have developed a great many institutions in our country. The rural school is one of those institutions. I think I can say (I regret that I have to say it) the rural school is the most inefficient institution that has ever been developed in America, and yet it is one of the most important institutions that we have, and I fear unless we redirect this institution early it is going to be lost.

Now, we hear a great deal about consolidation of our schools. I urge the consolidation of schools wherever it is necessary, but I fear, and I think the most of us realize, that if the rural school is lost then there is something in the active life of rural people that is also lost. But we need to redirect the rural schools so that we may teach some of the principles of plants and annuals, of fruits and flowers, of domestic science and arts, because these things are directly connected with the lives of the young men and young women who are to go back to the farm.

One of the subjects that we are discussing to-night comes in this direction. I would not ask that you teach horticulture in our schools to make gardeners of our people. I would ask you that you teach horticulture in our schools because of the real educational value there is in the subject. We say we have a great opportunity in our Agricultural College and other institutions for training for a life upon the farm; but when you realize that each springtime there are about 8000 young men who go back on these farms, and begin for the first time farming as a gainful occupation—for the first time take the occupation of the farm as their business—you see that one agricultural college can do but little in the line—can only lead out and direct a few in this great work. If we have 8000 young men taking up farming each year for the first time, and 8000 young women who soon follow, then for each to be educated in their work 64,000 people would be in our Agricultural College at one time. One college, then, is out of the question. Now, where are you going to give this training, if you do not give it in the country school, where the great majority of farmers' boys and girls attend?

For instance, some of the fundamental principles that underlie correct selection of the soils that have to do with orchards and gardens ought to be a part of school work.

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SELECTION OF SOILS.

It is impossible for us to lay down any fixed and set rules that shall govern the selection of a soil for orchard lands. We may call one type an ideal soil, but what we want more than an ideal type is a farm orchard for every farm. It would be folly to say that we want ideal conditions of soil for every orchard or garden; what we want is an orchard and garden on every farm, and we want to take the soils and so treat them that they will respond in the highest degree to profit and pleasure.

In the first place, just a word about soil—what it is—and that will give us a fundamental basis on which other propositions may be built. Now, in the first place, we have looked upon soil simply as dirt, and unclean dirt at that. The fact is, the soil is one huge and gigantic laboratory, and in that laboratory are forces and agencies at work redirecting and building that soil in a way so that it can do the work for which it is called upon by you as farmers and gardeners and orchardists. That soil is responsive in proportion as we bring the highest thought and culture to it; and as thought and care are applied that soil becomes more responsive. I think the greatest trouble in our agricultural work has been this: we have broadened our acres, but not our thoughts and comprehension. We wanted to get many acres into orchards, and we have not taken care of those orchards. The soil is this laboratory, and in this laboratory the agencies are at work all the time redissolving the soil, made up, as it is, of fine particles. These fine, minute particles represent the great framework, made of organic matter; and wet, frost and water, heat and cold—all these factors have been at work in disintegrating and breaking up and dissolving and bringing into further refinement, so that the little, tiny roots can get at their work and take out the parts which the tree desires, or different elements of food, or other elements that are necessary for the full fruition of the plant.

All investigation that has been conducted recently shows that we can divide our soils into certain types. You know a soil, for instance, that may be classed as a strictly clay soil is n't the best soil for orchards or gardens. It does fairly well for grass because it holds a great deal of water. You say you want water for your orchards, but you do not, when it spells failure. Then we have another type of soil that contains larger particles, the largest grains—the type that is known as small gravel or coarse sand, which, when reinforced with abundance of vegetable matter, makes the finest trucking land we have in the country. These soils take up water quickly, and also take the warmth of the sun quickly. We find an abundance of this type along the Atlantic seacoast. We have them up in Michigan. We have some of this soil in our section. It would be folly to grow some kinds of crops on this soil.

We have, then, a gradation from the finest type to the coarsest—fine sand and then a very fine soil, and then we come to the silt, and then fine soil, and then clay. Now these little particles influence the water that we have been talking about; they influence the plant-food. Now these little particles are all mixed together; millions of them in a cubic inch. If we had hunting-shot here, and if we would take this hunting-shot and put it in a glass and pour some water over it, and we should remove the water from the glass, we should find that around each shot is a small film of water. Now, that film of water represents the capillary water; it represents the

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water that dissolves the plant-food, and carries that water into the roots of the plant.

Some of us had tea or coffee to-night for supper, and some of us used sugar. We had long ago learned that, after we had put in a loaf of sugar, we had to stir it or else give some time for that sugar to dissolve, or the coffee or tea would not be sweet. Until we do the same with the moisture of the soil—so treat the soil that this water can dissolve the plant-food—we are not going to get the beneficial values out of this soil. Until we have broken up these soil particles, moved them around, readjusted them, so that water can circulate all through the soil—until this is done, we are not going to get the full effect of the plant-food or the water in the soil. So one of the first requisites in the management of orchard soils, garden, or, in fact, any agricultural soils, is thorough tillage.

Of course there are different ways to till the land. This statement does not mean that we are to turn the plowshare loose in the soil; it does not mean that we shall plow or till at the wrong season of the year. It does not mean that we shall give the sandy soils the same treatment that we give clay soils. But it means that we must study orchard lands ourselves; to give just the treatment that secures the greatest response. We can disk our orchards if we fear to plow them. We can grow rye or other cereal crop if our soils contain too much nitrogen. In fact, some of our trees do not bear because they are too abundantly supplied with nitrogenous food in the soil.

There is a principle acknowledged in all our plant and animal life; when we treat an animal or plant too well, sterility and lack of prolificacy often follow. It is also true with our trees. We know of instances—they are quite common, I think all of us are familiar with one or more—when hard treatment will bring results; if we drive nails in the trunks of trees that do not bear, they will respond and bear; if we cut some of the roots off of trees, thereby lessening the feeding ability and feeding power, then we can increase often the bearing ability. Of course such treatment is radical, but often it is necessary to bring about the desired end.

Soiling crops may help, but the difficulty in growing soiling crops is that they take great quantities of food and water out of the soil. That is the great difficulty of such methods. What we are after, it seems to me, is to get plenty of water, in order to take care of the tree during its spring and summer activity. In fact, one thing that has been brought most prominently before us in the last five years has been the realization of the value and meaning of water. Another of the things that has been brought out is that all soils contain great quantities of plant-food, but plants cannot get at this plant-food because of the physical condition of the soils. To help in the work we must control the water-supply. It has been estimated, and I have no doubt, that right around through this section there is often not more than fifty per cent. of the water which falls as rain that gets into the soil. There is an abundance of water in Kansas to produce remunerative crops of all kinds, if it is taken care of. It takes four inches of water to produce eight bushels of wheat; it takes nine inches of water to produce sixteen bushels of wheat; it takes fifteen inches of water to produce thirty bushels of wheat. We have an abundance of water, therefore, in our section.

It takes a great deal of water for the production of orchard crops because the trees are pumping out of the soil great quantities of water all the

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time. Open up the soil and let the water move into the soil, and once in the soil, maintain it there. In the paper just preceding one man allowed the weeds to grow up and then mowed them down and made a thorough mulch over the soil. That mulch acted in the way to do the most good. It kept the water in the soil. We know when we pass along the road or elsewhere, if we kick up a stone, or even the dry dirt on the roadside, we find it moist, because the dirt or stone acted as a mulch and kept the water from escaping.

How many times we shall till, or when we shall till, depends on the nature of the land. Up in northeastern Kansas we would not think of tilling the land just as we would down in southwestern Kansas. Certainly no one could find any fault with disking the soil and growing clover, and to a certain extent mixing the clover in the soil so as to keep up the supply of humus and to enlarge the water-holding capacity of the soil. I think one of the problems we have in most sections in this state and in other states is, How may we increase the ability of the soil to hold water? We very often cultivate our orchards too much, and burn up the humus. One gentleman suggested that he cultivated eight times. He burned out the humus. It takes very little tilling to get rid of it, and we can only restore it by adding stable manure, and with that we are, of course, all the time bringing weeds to the orchard.

We can grow clover and other sorts of crops so that we can maintain the supply of nitrogen in the soil, and we can destroy those clover crops, or other crops, so that at the season of the year when we want the greatest amount of water the crop is out of the way and is not pumping water out of the soil and away from the tree that needs it. Of course, there are many sorts of tillage tools that we can use, but the one general principle is to get water into the soil; and, when water is once taken into the soil, how are we to keep it, protect it, and store it until the plants need it? In open soils that readily admit water, admission of water is simple, but to keep it until most needed is another problem.

BACTERIA IN THE SOIL.

One of the things that irrigation men have discovered recently is that lands need water; but they also need tillage. The orchard men, who in many sections of our country have been irrigating, have found that after they have irrigated they must also till; consequently in many irrigating sections to-day people are using less water, and protecting that water when they have got it into the soil, because, just as long as you keep the soil saturated you work against the bacterial life that is doing so much for the benefit of the soil.

There are just three or four of these that I want to speak of. You add any organic or vegetable material to the soil, knowing that it will decompose just as soon as this material gets incorporated in the soil. There comes along a crowd of putrefaction and decay bacteria, and these decay bacteria destroy and tear the vegetable matter, and put it in shape in the soil so that the plant can secure and later use it for food. But it is not plant-food yet. Another crowd of bacteria comes along, and these break it up further; and then another crowd comes along—bacteria that change this nitrogen into nitrites. This organic matter is almost changed into the form which plants can use, but not quite. The next step is made by other bacteria, which

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change the nitrites to nitrates. The tubercle bacteria which grow on clover or alfalfa roots gather nitrogen from the air, and are still another class.

Some of you use commercial plant-food. One of the materials you buy often is a nitrate—nitrate of soda, let us say. Now, that nitrate of soda is plant-food just as soon as it gets into the soil and is dissolved. All this nitrate that is in the soil must be dissolved in the water of the soil before it can be utilized by the plants as food. When the putrefaction bacteria are working, and they work as long as there is any organic matter in the soil, they loosen the nitrogen locked in the nitrates and by so doing cause it to be lost to the soil. Potassium and phosphorous, being mineral materials, are left alone. So long as the plant is n't using large quantities of nitrates that exist in the soil, as is the case early in the season, the plant does n't suffer; but later, when the plant does require a large quantity, as during the period when the plant is fructifying, we can't afford any nitrogen loss. If you add organic matter, like stable manure, to your orchards or your vineyards about the time your crop is maturing or in midsummer, you simply start putrefaction bacteria to work and they destroy the nitrogen in the soil and send it back into the atmosphere. Hence different kinds of partially rotten manures should go in the orchards after they have fructified in the fall or winter, because at these times the nitrates are used up and the addition of manure can do no harm from the standpoint of bacteria.

A few years ago your Society did not pay any attention to bacteria at all; now you are coming around and saying you cannot raise good fruit unless you spray your fruit. Whether you believe in spraying or not, it is the truth indisputable that spraying goes hand in hand with the highest production of orchard crops. It is the bacteria at work there that destroy that crop. You may spray for insects, or you may spray for fungus, but spray you must if you would get the best sort of crops, in my judgment.

The next step in the treatment of garden and orchard crops will be in a way a study of the bacteria down in the soil. I believe there are failures because we do not know bacteria better. Fields are not producing the corn or wheat or alfalfa they ought to produce, simply because there is something wrong down in the soil with the bacteria development; and just as soon as we understand the matter better we will correct the trouble. Let us look upon the soil as an essential element in profitable orcharding.

PRESIDENT TAYLOR: That completes the program as it is printed. It is early yet, and it seems a misfortune to allow two such papers as those of Professor Burkett and Mr. Underwood to go without discussion. Brother Snyder, don't you want to say something on one or the other of these?

MR. SNYDER: I don't know that I am prepared to discuss either of these papers so that it would be particularly entertaining to anybody. I was a good deal struck with Mr. Underwood's—the point he made that orchards are frequently cultivated too much. I believe this is true, and that it is especially true of orchards that are on rolling ground. Too much cultivation results in their washing badly.

J. W. ROBISON: This subject of manipulation of the soil, of bacteria, and of chemical work on the soil is just beginning. Nature here had long years to prepare the soil for planting, and we have cultivated the soil, and as we have taken grain and grasses off the land we have been using up that soil. Now, how are we going to put it together again? It has been said

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that we do not need the same cultivation for orchards. We do not need the same! A very instructive example of this was an alfalfa field that I saw that was a little over half a mile across. It had three distinct varieties of soil—the second-bottom soil, a little reddish clay; the blackest, richest soil of the bottom in the middle of the field; and down along the timber, near the edge, was some grubbed-out soil. The middle of September it got about three inches high on the bottom; on the second-bottom, with the reddish clay, it was two inches high; but down in the grubbed-out timber land it was a foot high; the same drill mark right through. Nothing different here but the soil. The soil originally was not different. The ground back on the high land had been robbed, and down near the timber there was plant-food enough. Now, how are we going to change that upland soil? We must study the plant that will develop that soil. We probably have nothing better than alfalfa now, but the timber land did not need the alfalfa. It would bring large crops of any kind of grain. The other soil had been robbed so that it needed something to build it up—something beyond that chemical action of bacteria going on. Work that soil and get it into proper condition for any kind of crop. Now, the nodule on the alfalfa plant is one of the bacteria of the alfalfa plant. A little fertilizing and cultivating develops that nodule so that it is forced to act on the soil. I know in some of our fields we started the manure-spreader diagonally down over the field, with very little feed—three tons to the acre—and the whole season you could see the track of that manure-spreader where it had laid the barn-yard manure. The barn-yard manure liberated the nodules and the other elements and set them all to work to accomplish the enriching of the soil. It may take the nitrogen out of the air that comes from the Gulf of Mexico, it may take it out of the air that comes from Arkansas, and fix it in our soil here to grow our crops.

Now, this is the study we want the Agricultural College to do. We want the experiments that they have made there made up so that we may know what is the actual work under any of those soils. It might be taught in the public schools. There is surely nothing better to start the mind a little on that line. Children must be interested in something, and they can start to learn something that is useful just as well as something that is not useful.

PROFESSOR MASSEY: I was very much interested in Professor Burkett's talk along the idea for redirection of our public schools, and especially the district schools. I don't know whether I exactly understand him in full. I believe that the solution of the district school is to kill it to start with, and then redirect and rebuild on a better foundation. A great deal of trouble with our district school to-day is the fact that we have too many lines of diversification, and we do not have time to teach all these things.

PRESIDENT TAYLOR: I consider we are getting along famously. We are spending the time with excellent results.

DOCTOR BOHRER: I am very much interested in the lecture given by Doctor Burkett, and to help and strengthen it, I hope to read a paper before this Society along the same lines, and touch the same subject, at least, that we have discussed here this evening. Speaking of the common school, I was brought up on the farm, and have always lived in the country, but the average school is an eyesore to me wherever I go. They are not ac-

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complishing the objects for which they were intended or for which the country school was created, and it is true that forty-nine perhaps of the young men and women out of every fifty begin and finish their education in those common schools. It is an education after a fashion.

DOCTOR BURKETT: I want to say just one word. Of course, in introducing this subject of rural education I was introducing something that did not belong to my subject; but some years ago I made a resolve that on every occasion, no difference what the occasion, that I made an address, I was going to make an appeal for the redirection of our rural schools, and that is the reason I mentioned it to-night. I believe in the consolidation of schools. It may not be in your time, but I believe the township high school, or the township school with a high school there, will be the sort of education throughout Kansas and in every other state. We will carry our child through all the grades up to the high school, and we will give him a redirected course of school study in that township high school and in those undergrade schools. Why, the very arithmetics that your children are studying to-day are teaching allegation. I saw a school-book the other day that had twenty-five or thirty pages taken up with allegation. That has been abandoned; we are not using that any more. What we want is to teach those sorts of things that have to do with the environment of the child. Life is the essential education. These other things are just means that will make them fully-rounded men, as I have used this expression. It is all right if you must teach about King George and King Charles, but my boy and my girl must be taught about King Corn and King Cotton. You may say that the laws of the Medes and Persians ought to be in there. All well and good; but the laws that underlie planting and animal development are going to concern my boy and girl more than all these other things put together. I believe that any subject, followed concretely and long enough, if it brings mental discipline in its study, is bringing culture and power. We cannot expect all our young men and women to be graduated from the Agricultural College; 8000 each year are too many. But let us give them something that is along their line, and show them that horticulture and agriculture are sufficiently dignified to receive thought and study in the school.

THE USES AND LIMITATIONS OF SOIL ANALYSIS.

By PROF. J. T. WILLARD, Manhattan, in *Industrialist.*

In the early history of Kansas no attention was paid to the composition of its soils, except to boast of their inexhaustible fertility. The voice of the chemist has been lifted constantly, warning the people that this idea of possession of a fertility that is practically limitless is a delusion that can lead only to the squandering of our natural resources, and to leaving posterity handicapped in the struggle for existence. To-day he is seeing his warnings justified. People in many localities of the eastern part of the state are making inquiry concerning chemical analysis of their soils with reference to learning what fertilizers should be applied and to what crops their soils are best adapted. A consideration of some of the aspects of this problem would seem to be timely.

The chemical composition of a soil is the most fundamental limit upon its usefulness. No matter what its depth, physical state or climatic environ-

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ment, a soil that is actually deficient in one or more of the chemical elements essential to plant growth cannot be productive. Hence, a thorough-going investigation of a soil cannot be made except it be on a chemical basis. However, the difficulties of a chemical investigation that shall lead to results that can be translated into definite statements concerning the special adaptation of a soil to a given crop, or into a prescription to meet its needs in the way of applications of fertilizers, are so great that at present they have been very incompletely surmounted.

All but a very small proportion of a soil is unavailable for the nutrition of plants and serves only for their mechanical support. The roots penetrate through to relatively great distances, both downward and sidewise, and thus the plant is anchored to a weight that enables it to stand upright. This mechanical function of a soil may be performed by material that is wholly inert in respect to nourishing the plant, or by material that to a certain extent is capable of undergoing changes whereby it becomes available. The nature of this more or less inert portion of the soil is thus of the greatest importance in respect to the endurance of its fertility. It can be readily seen that, if a chemical analysis of the total matter of a soil be made, and it be found wanting, the soil is hopelessly poor. It is, however, only with soils that consist almost entirely of quartz sand that such results would be obtained. On the other hand, the presence in a soil of adequate amounts of all the chemical elements essential to plants is no proof that the soil is fertile, since these elements may be in forms of combination such that plants cannot get them. Chemists have therefore sought for special means of analysis that will enable them to ascertain what amounts of the several elements are available to plants, rather than the total quantities of those elements.

No chemical means have yet been discovered that will test soils as a plant does. One difficulty in the way is that the different kinds of plants differ greatly in their power to acquire nutriment from a given soil. If by prolonged research a mode of investigation should be devised by means of which quantitative results could be obtained that would be proportional to the yields given by a certain crop, under otherwise favorable conditions, the results would not be completely applicable to other crops. This adds greatly to the complexity of the problem.

The nutriment that a plant gets from the soil enters it dissolved in the soil water. It might at first sight seem that simply ascertaining what amounts of the substances in a soil are soluble in water would disclose its crop-sustaining power. This is not the case, however. In the first place, if water be kept in contact with a soil until there is reason to believe that it is saturated, and it then be removed, a fresh addition of water will dissolve more from the soil, and a third amount will dissolve yet another portion. The soil may be treated indefinitely with these successive portions of water and continue to yield material which goes into solution. In the second place, it seems undeniable that the roots of plants influence the extent to which soil particles in contact with them are dissolved, by means of substances which pass from them to the soil. In this way some crops are enabled to extract more nutriment from a given soil than others can. Again, the presence of decaying organic matter—humus—in the soil, by its production of carbonic acid, increases the solvent power of the soil water, an effect

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that extends over years of time. For these reasons analysis of a water solution of a soil will not teach us what capacity for nourishing plants the soil possesses.

As plants have some specific solvent effect upon soils, chemists have attempted to find a solvent that will imitate their action. In this they have only partially succeeded. The use of a two-per-cent. solution of citric acid, suggested by Dyer, has in many cases given consistent indications. In others the cultural experience has been at variance with what would be suggested by the analytical results. We have not thus far found any solvent that will upon all soils give results consistent with the yield returned by a single kind of crop, much less by all kinds, and it is not to be expected that such a solvent will ever be discovered. The conditions of absorption of plant-food by the living cells of the rootlets are different from those presented by an indifferent substance. This is indicated not only by recent observations on osmosis, but more simply by the fact that different kinds of plants growing together in the same solution or soil take up quite different quantities of the nutritive salts. This so-called selective action must determine that each kind of plant is for itself an independent case for investigation in respect to its relations to soil fertility and soil analysis.

Whatever may ultimately be accomplished in devising means of imitating the action of plants upon soils the results so obtained will indicate the immediate capacity of the soil rather than its aggregate fertility. As previously stated, soils may have a part of the chemical elements in such stable and insoluble combination as to put it entirely outside the probably more or less remotely available plant-food supply. Aside from this nearly insoluble part we have another that dissolves in moderately strong hydrochloric acid. What will dissolve in a few days in hydrochloric acid will dissolve in weaker acids, such as are found in soils containing humus, if a few years or centuries be given, and the amounts progressively dissolved be removed by the roots of plants. The ultimate quantities of the elements of fertility that can be utilized by crops is thus taken to be practically those that may be brought into solution by hydrochloric acid of specific gravity about 1.12. A chemical analysis of such a solution may be of great value in determining the probable permanent durability of a soil, and to a less extent its immediate capacity.

It has been found that any virgin soil that shows an ample supply of nutritive substances soluble in acid as described will be fertile provided there are no greatly opposing influences in the physical condition of the soil or in the climate. With soils long under cultivation, however, by whatever means they may be analyzed, results may be obtained that are more or less contradictory to cultural experience.

Soils may get into a condition of non-productivity, the causes of which are obscure as yet. The influence of the previous cropping, whether different or the same, may greatly affect the yield of the present season. In some cases failures are traceable to fungous diseases with which the soil becomes affected. In other cases there is reason to believe that crops leave something in the soil that hinders the growth of succeeding crops of the same kind until it is removed. Some experiments by the Bureau of Soils have shown that in certain cases this condition seems to be corrected by the use of substances which do not themselves contain chemical elements of fertility. It is not impossible that a part of the beneficial effect of commer-

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cial fertilizers and barn-yard manure is due to such action, though there can be no doubt that their effect is not limited to this, but that they supply needs of the crop in respect to chemical elements. The need of rotation of crops in order to maintain proper soil conditions is probably greater with many soils than is its need on account of any partial exhaustion of chemical elements.

The difficulty of drawing inferences concerning crop-producing power from chemical analyses only may be illustrated by referring to an experiment by Hilgard, in which a highly productive but heavy clay soil was mixed with one, three, four and five times its weight of purified sand. Plants were grown in a pot of the original soil, and in pots of soil of the four degrees of dilution by sand. It was found that up to and including the dilution with four times its weight of sand the plants made better growth in the diluted than in the original soil. Here, then, was an example of a soil-mixture with only one-fifth as much of the nutritive elements, and these in the same ratios to each other as in the original soil, that gave even better results than the undiluted soil. In short, chemical composition is very important, but it is only one of the important considerations in respect to productivity.

Not only is the physical state of the soil an important factor in determining crop yield, but its depth, and the depth, composition and general character of the subsoil are of the greatest significance. Further, in respect to sampling a soil for analysis, if this be not properly done, so that the sample analyzed actually represents the land under investigation, the results of the analysis are worthless as a basis for any general conclusion

It will be seen from the foregoing that a chemical analysis of a single soil sample may mean very little, but to be of any service it must be considered in connection with many other things. To be of the most use it should be possible to compare it with the results of analyses of adjacent uncultivated soils and of other soils in similar climatic environment. The physical conditions must also be carefully considered.

Partial analyses of soil directed toward answering definite limited questions are often very useful. Soils have been known to contain an abundance of nitrogen and yet to be deficient in that element in an available form. Organic matter may be so slightly decomposed as not to be in a condition to furnish nitrogen to crops, while the fully humified part can undergo nitrification promptly and thus supply this element; hence a distinction in the analysis between these two forms of nitrogenous matter may contribute much information. So, too, it has been found that phosphorus in humus is more available to the wheat crop than when in some other forms of combination.

So-called alkali soils are soils containing an excess of soluble mineral substances which do not in all cases give an alkaline reaction. An analysis of a soil with reference to excessive amounts of such mineral substances may be made a useful preliminary to any treatment to improve the condition. A qualitative analysis is certainly necessary, as the nature of alkali differs greatly, and proper treatment of it cannot be prescribed without knowing the nature of the excessive salts present.

Some soils are deficient in lime, or, speaking more exactly, in calcium compounds, especially the calcium carbonate which is capable of neutralizing organic acids. A fertile soil for agricultural crops must be in a neutral or faintly alkaline condition. Analyses with reference to soil acidity are therefore often of much value. Independent of acidity, leguminous crops,

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such as clover and alfalfa, require large amounts of calcium, and regions other than those in which limestone and gypsum are found may often require special investigation in respect to the calcium content of the soil.

The limitations upon the extent to which chemical analysis can be used in forming a judgment upon soils has led to attempts to replace that mode of investigation by physical or mechanical analyses in which the size of the soil particles and in part the peculiarities of their mode of aggregation are studied. The relative dominance of certain sizes of particles in soils used largely for certain crops has been observed. However, the fact that the same crops may be quite successfully produced on soils of distinctly different mechanical composition makes this method of little practical use, however interesting a field of laboratory study it may be. The influence of rainfall, temperature, altitude, exposure and other climatic factors exceeds physical constitution in their dominating position to a far greater degree than does chemical composition. A suitable physical state may accompany an almost sterile condition. The sizes of the rock particles of a soil that has been exhausted by cropping are not materially different from what they were when the same soil was in its virgin state of fertility. At best the results of a physical examination of a soil are useless unless they are accompanied by the results of a searching chemical examination.

No kind of laboratory investigation of the physical properties of a soil possesses more than a small fraction of the value of observations upon the soil in place, with no more complicated equipment than one's eyes and hands and an auger. The lay of the land, the depth and texture of the soil and the depth and character of the subsoil are points that immeasurably exceed in importance any other physical characteristics.

Both chemical and physical investigation of soils in a laboratory way being limited in the usefulness of their results, these must be supplemented or in many cases replaced by observations upon the natural growth of trees, shrubs, grasses or weeds upon the soil, and by experiments in the production of plants or crops upon it. Let organic nature answer the question, What is this soil good for?

Observations concerning the natural plant growth upon a soil have always been used by practical men in judging of its value. The rich lands supporting a forest growth of oak, hickory, and other hard woods, are in marked contrast with the poor, and even otherwise nearly barren, areas occupied by pines. The grasses of the rich prairies are very different in species and luxuriance from those of thin, alkaline, saline or otherwise unproductive regions. Even weeds seem to exercise a preference, and sand-bur land is very different from that best adapted to "pusley." This means of gaining an insight into soil values is one that, while used from time immemorial, is worthy of more extended study and application.

Attempts to test soils as to their productiveness of their specific needs in the way of fertilizers have been made by means of experiments conducted in pots. The sizes of the pots used have varied from that of a capacity of a few ounces to one of several hundred pounds. Very valuable results have been obtained by this method, into the details of which space does not at present permit us to enter. It can readily be seen, however, that with climatic factors largely eliminated, and with a soil no longer in its natural state of aggregation or relation to subsoil, some of the most important features controlling crop yield are left out.

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By far the best method yet devised for testing soils is by means of crops grown in the open field. Such experiments, in order to eliminate variations from season to season in rainfall and other climatic influences, should extend over a series of years to yield the best results attainable, but in a single year, if the season is not too abnormal, positive indications may be obtained. It is obvious that a soil may be deficient in but one or two of the essential chemical elements, and that in that case it would be a waste to purchase and apply fertilizers supplying elements not needed. Further, one may be disposed to apply to the soil an incomplete fertilizer, or an amendment that happens to be cheap or readily available, when in fact the soil is in need of something quite different. As a matter of economy, it is highly important that the farmer ascertain what is lacking in his soil before deciding upon the purchase of commercial fertilizers, or the kind to buy. The chemist cannot tell him with certainty what the soil needs, and no method has yet been devised that is equal to that of testing the land by means of crops that have been fractionally fertilized.

A test of this kind consists in laying off a series of plats on the soil in question, selecting an area as nearly uniform as possible, and applying different fertilizers to the several plats, leaving one or more unfertilized for comparison. The number of plats required depends upon the detail with which the test is to be made. Not less than four will suffice, and if this number is selected one plat will be left with no fertilizer, to one a potassium salt, to another a nitrogenous fertilizer, and to the other a phosphate must be applied. On comparing the crops obtained on the three fertilized plats with that given by the unfertilized one, the effect of potassium, nitrogen and phosphorus compounds separately applied will be ascertained. If it be found then that the nitrogen has increased the yield while the potassium and phosphorus have had little if any effect, the conclusion must be that the soil is in need of nitrogen and not of the other two. If the plat receiving potassium shows an increased yield, a deficiency of that constituent of the soil will be indicated.

More comprehensive results are obtained by increasing the number of plats and including, in addition to those previously named, others to which nitrogen and potassium, nitrogen and phosphorus, phosphorus and potassium, and nitrogen, potassium and phosphorus compounds, respectively, are applied. In this case, too, it is well to add another plat, to be left without any fertilizer, making nine altogether. This arrangement will show the results of each of the three fertilizing constituents and of possible combinations of them.

There is one serious drawback to an experiment of this kind. Plat experiments which are designed to be exact duplicates have frequently been found to give considerably diverse results. For example, if in the field to be tested a series of nine plats were to be laid off and no fertilizer applied to any of them, the yields obtained from the several plats would not be the same, in all probability. This source of error can be avoided in two ways. The first is by testing the land for a few years without fertilizers, ascertaining the relative yields of the plats in their natural state. This is probably the best method as preliminary to a thorough investigation, but does not yield immediate results. The other method is to multiply the series of plats as many times as practicable and take the average result of the correspond-

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ing plats. Thus, if the series were repeated three times, we would have the arrangement indicated by the accompanying diagram.

The average yield without fertilizers of the twenty-five plats will be shown by the average of plats 1, 9, 17 and 25, to which no fertilizer is applied, and the result will obviously be more reliable than if we should depend upon any one of these alone. Even if the total amount of land devoted to the experiment be no greater, these four plats represent the total area more truly than any four side by side. So, too, the effect of a nitrogenous fertilizer alone will be shown with greater accuracy by taking the average yield of plats 2, 10 and 18 than would be the case by applying nitrogen to a single plat three times as large. The same considerations, of course, apply to all of the others, and the greater the number of repetitions of these series the more reliable the conclusions drawn from the results.

A PLAT FOR EXPERIMENTAL FERTILIZING.

1. Nothing.
2. Nitrogen.
3. Potassium.
4. Phosphorus.
5. Nitrogen and potassium.
6. Nitrogen and phosphorus.
7. Potassium and phosphorus.
8. Nitrogen, potassium, and phosphorus.
9. Nothing.
10. Nitrogen.
11. Potassium.
12. Phosphorus.
13. Nitrogen and potassium.
14. Nitrogen and phosphorus.
15. Potassium and phosphorus.
16. Nitrogen, potassium, and phosphorus.
17. Nothing.
18. Nitrogen.
19. Potassium.
20. Phosphorus.
21. Nitrogen and potassium.
22. Nitrogen and phosphorus.
23. Potassium and phosphorus.
24. Nitrogen, potassium, and phosphorus.
25. Nothing.

The interpretation of results obtained from such a series of plats is easy. Representing the entire series by the numbers of the first ones, it is obvious that if no material differences are noticed in the yields of the several plats, no fertilizers would be advantageous. If Nos. 2, 5, 6 and 8 showed increased yields not exhibited by any other plats, the necessary conclusion

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would be that the soil is in need of nitrogen, but not of anything else. If plats 2, 3, 6 and 7 showed increased yields, while plats 5 and 8 showed still greater increases, the conclusion would be that the soil is in need of both nitrogen and potassium, either of these alone producing a beneficial effect, but fertilizers containing both producing a still better result. If at the same time the plat receiving phosphorous only showed little or no effect, and phosphorous with nitrogen, or with potassium, or with nitrogen and potassium, showed but little or no advantage over the plats receiving nitrogen alone, potassium alone, or nitrogen and potassium, respectively, it must be decided that phosphorous is not required by the soil. By similar lines of reasoning, any possible results may be interpreted; but for the greatest accuracy in such experimentation it is necessary to perform the preliminary experiments referred to, in which the relative yields of the several plats are ascertained through a series of years without the application of any fertilizers, and giving the plats strictly uniform treatment.

While these precautions are necessary for the most concordant and satisfactory conclusions, results of value may be obtained by the four-plat test first described, and no farmer can afford to spend much money for commercial fertilizers without having ascertained, by one or another of the plans above described, the actual needs of the soil. In carrying out a fertilizer test of this kind the plats should be long and narrow, rather than square, and one-tenth of an acre and upward in area.

The practical fertilizing test may, of course, be extended to include other points such as would require applications of calcium (lime) compounds or organic matter. In many cases of soils that have become unproductive or gotten out of condition the deterioration may be traced to diminution of the humus or organic matter in them. Before deciding that commercial fertilizers are necessary, the effect of green manuring should be ascertained. It should also never be forgotten in this connection that barn-yard manure, because of its content of organic matter in a state of decay, is superior to chemical fertilizers containing equal amounts of potassium, phosphorus and nitrogen compounds.

The preceding considerations may be summarized briefly. A thorough chemical analysis of a soil is indispensable to any comprehensive study of its condition and probable durability. Such chemical analysis may not be sufficient alone to give positive indications concerning the present productiveness of the soil, or its needs in respect to fertilizers. Chemical investigation directed toward certain specific points may be of great value in respect to a given soil. Laboratory tests of a purely physical character afford little if any information that cannot be obtained better by examination of the soil in its natural condition and position. The immediate fertilizer requirements of a soil are best ascertained by means of systematic fractional fertilization of different crops.

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SECOND DAY—MORNING SESSION.

FRIDAY, December 28.

Called to order by President Taylor. Prayer by Reverend Doctor Estey, of the First Presbyterian church, Topeka.

THE VICE-PRESIDENT'S REPORT.

By EDWIN SNYDER, Oskaloosa.

The horticultural history of 1907 is easily written. Never before, "within the memory of the oldest inhabitant," has any year shown a total failure of all tree fruit.

The experience of the year emphasizes the fact of the great financial risk of special farming in this climate. It won't do to carry all your eggs in one basket. Diversified production is the only safe course for tillers of the soil. It is all right to have some one principal line upon which to bestow intelligent, persistent effort, but other lines differing materially from the main issue should be had in reserve to fall back upon if the main issue fails.

I do not assume to give others advice as to what line or lines to take up with fruit growing, but, for my part, I have found hogs, with alfalfa for pasture and hay, and mule-raising, a good combination.

If fruit fails and hogs die of cholera, I still have the mules to fall back upon, and they have never failed me yet. I have pastured my orchards with them this year; indeed, they are still running in the orchard, much to their advantage and no detriment to the trees, which they will not molest if they have plenty of range.

My orchards are mostly seeded to clover, with some timothy. When I have a fruit crop of course I cannot pasture with mules, but I mow, allowing the grass and weeds to lay as they fall. I think it better than to undertake to cultivate, and much less expense of labor.

I read that orchardists in the hill regions of Ohio practice pasturing their bearing orchards with sheep to advantage, as they consume the wormy and defective fruit as it falls, as well as the inferior fruit which is usually produced upon the lower limbs. I think I will try this when I have another crop. I think they would be especially useful in seasons like 1906, when I had thousands of bushels go to waste and rot under the trees. However, I do not look for these conditions to occur again with me, as a large canning factory is being built at Oskaloosa, which we hope will be able to take care of the surplus fruit of the near-by country.

One half of the commercial orchardist's business is to economically produce crops of fruit; the other and often quite as important part, is to dispose of the same to the best advantage.

It requires skill and business ability of no mean order to get the real value out of a crop after it is grown. The gap between the producer and the consumer is too wide. Where fruit growing is a specialty, as in parts of California, coöperative marketing has nearly solved the problem, and go-betweens are not allowed to absorb the larger part of the producers' profits. In this country, where fruit growing is a side line, it is every man for himself, and the "commission man" gets the hindmost.

My 1906 pear crop was large and of fine quality. I sold the down fruit at twenty-five cents per bushel in the orchard. I saw the same quality of

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fruit retailing at fifteen cents per dozen in the city. The man who sells at wholesale and buys at retail seems to be handed the hot end of the poker all the time.

One of the most serious problems confronting the commercial orchardist is to secure adequate labor at a price which will leave him any profit in the business.

Year by year it is growing worse. What the final end will be I do not attempt to predict; perhaps some philanthropist may yet invent a scheme of coöperation between labor and capital which may serve to render the two interests identical and harmonious. Up to this time my greatest annoyance has been to procure labor to handle fruit, and to put up with the half-hearted, inefficient, perfunctory article I have been able to secure.

When all labor becomes unionized, and I must submit to arbitrary dictation as to whom I may employ and as to wages I shall pay, bleating sheep and braying mules will be seen in all my orchards, whether the trees are barren or fruitful. In short, I will quit the fruit business.

A matter now before Congress that should receive the indorsement of all horticulturists is the parcels post. Every one who has had occasion to order seeds, scions or nursery stock by express has felt the heavy hand of the grinding monopolies, the express companies. Nothing could be more absurd than the present arrangement for transporting parcels through the mail. There are some thirty different nations whose citizens have postal privileges at the hands of our government not granted to our own citizens; for instance, a citizen of London, England, can send me a four-pound parcel by mail for fifteen cents less than I can send the same package to my nearest neighbor by rural free delivery. Every civilized nation but ours has a parcels post, by which parcels of eleven pounds or less are carried at a fraction of the cost of expressage. Express companies have thus far been successful in defeating legislation along this line. A note to our congressmen and the United States senators would help in securing this beneficent law.

In conclusion, I have faith in the future of commercial horticulture. The consumption of fruit is fast increasing, and the fruit grower who has grit and persistence will win in the end. His success, in spite of occasional unfavorable seasons and conditions, will be finally assured. And besides, the profession of horticulture should be regarded from a higher plane than a sordid one of mere mercenary gain. There is an esthetic feature which should not be overlooked. Fine orchards adorn the landscape; beautify the farm; contribute to and cultivate higher tastes and ideals; lend a grateful diversity to an otherwise monotonous rural life; furnish an abiding place and refuge for our feathered friends, birds of song and birds of plumage, and in numberless ways contribute to the comforts and joys of life.

The difference between optomist and pessimist is droll. The optimist sees the doughnut and the pessimist sees the hole. Let us be optimists, scatter sunshine, hope and deeds of kindness along life's pathway; we will be better and the world happier therefor.

Let us all be optomists, and hope that, as our orchards have had a vacation in 1907, they may do double duty in 1908.

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REPORT OF THE EX-SECRETARY.

By WILLIAM H. BARNES, Topeka.

To the Officers and Members of the Kansas State Horticultural Society: Having filled the office of secretary of this Society for six months of the past year, rounding out twelve years of active service therein, I now make my final report to which you are entitled.

My report is for the six months previous to July 1, 1907. At the meeting of the official board immediately following the fortieth annual meeting two official entomologists were elected, namely, the entomologist of the Kansas Agricultural College, and the entomologist of the State University.

The great surprise of the year 1907 was the hot spell of weather from March 19 to 26. Never was vegetation so forced in this state since its settlement. Every tree and bush suddenly and magically burst forth into bloom; all nature was smiling, wondering, and sweltering. The astronomers theorized in vain; a comet was given credit, and deadly fear added. Soon came a reaction, and on May 3 a hard freeze; May 4, four inches of snow and more freezing, and good-by to the major portion of the fruit crop. It looked for a time as if many trees might perish. Some of the berries escaped, mainly in latitudes where blooming was retarded; but apples, pears, peaches, plums and most of the cherries did not materialize; grapes put forth new growth, bloomed, set fruit, and bore a moderate crop. Up to July 1, the expiration of my term, no encouragement or promise of tree fruits was received from any part of the state. The trees were making a remarkable growth, preparing for another year. I was exceedingly sorry to hear that some contemplated cutting down their fruit-trees, and hope this has not occurred to any great extent.

On the 1st day of July the outgoing treasurer, Walter Wellhouse, turned over the treasurer's accounts, papers and $556.22 of Society money to his successor, E. G. Hoover, Wichita, and received from me full possession of the office and its appurtenances as my successor.

Up to July 1, 1895, when I came to the office, only 76 life certificates had been issued. On July 1, 1907, when I retired, there had been 224 issued. Each year a few interested parties at our meetings—commission men, real-estate dealers, nurserymen, and enthusiastic visitors—take annual memberships, paying one dollar for the good of the cause; some of these are never present again, some renew and finally take life memberships. I believe that the worse the conditions the more need of instruction and more useful the Society. When every grower is overwhelmed with plenty no help is asked for; but when disaster, like frost, rot, worms or blight overtake us we need advice and help, and should get together and study out remedies. This year, with its troubles and losses, should add a long list to the inquiring class—the probationers.

The late legislature created a board of tax commissioners, and ordered that they should maintain an office in the state-house. This board demanded much room for its work; some other department complained of cramped quarters; covetous eyes were cast upon the beautiful and convenient home of the State Horticultural Society. I visited and talked with every member but one of the Executive Council, and was assured by a majority that we would not be disturbed; and the Council met, voted and saved (?) us! But discontent still prevailed; the value of this department

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was deprecated, and other departments of far less importance to the people demanded our quarters, and another meeting was had, another vote taken, and we had to move.

I presume I should not be critical—I am not now secretary—but I have been a citizen of Kansas for thirty-seven years, and as secretary of this Society for twelve consecutive years I think I know as much of its value and needs as any man in the state, and I have a right to enter my protest against wrong, and it was certainly wrong to in any way hamper this line of work. The new rooms are nice—any room is nice if fixed up by horticulturists—but the location is unhandy, and they do not compare at all favorably either with our former rooms or with other departments.

The legislature sows with a free hand your money to many departments, and withholds from this, the second in importance in the state. Witness: our secretary gets $1500 per year, a new dairy commissioner $2000, three railroad commissioners $2500 each; and several others, whose office does not require as intricate a practical education as this requires, get $2500 per year. Tell me why a dairy commissioner is so much more valuable than a fruit commissioner. Tell me why this state can afford to appropriate $94,000 for military, $12,000 for traveling library, $70,000 for domestic economy, $70,000 for veterinary science, $80,000 for engineering—all of which and many others were appropriated by the late legislature; and for the work of this Society, the meager sum of $6640, and limits its force to two persons.

The Traveling Library Commission and some other commissions get three dollars per diem, while our trustees do not get a per diem. The state can undoubtedly afford to furnish free reading and free school-books—but why slight other fully as important and worthy objects. Outside of an ordinary education, our greatest need is the education of the masses in usefulness, and no employment to be successful requires a knowledge obtained by the experience of others more than horticulture.

Horticulture at our fairs and exhibitions, county, state and national, is hampered by executive boards made up mainly of merchants and professional men. Horticulture in our schools can scarcely be taught without practical knowledge. Many students of our Agricultural College think they can teach horticulture without practical knowledge obtained by practical contact with horticulture in nature. The farmers' institutes held in our state give too little attention to practical horticulture. The indifference of many of our people towards horticulture is largely the result of the energy put forth by distant horticulturists, railroads, express companies, commission men, retail grocers, fruit and market men, who at the present day, for the money there is in it, keep our markets supplied with horticultural products, and a majority of the consumers do not care a "fig" whether it comes from a neighbor or from the antipodes, if they only "have the price." "Standing up" for the state might include the encouragement of our toilers by the purchase of home productions. Labor unions combine to keep away foreign competition; the horticulturist is yet too unselfish to do anything drastic to even save his own life. The Kansas gardener mournfully stands around and sees his productions set aside for those of a similar kind, often no better, from abroad. The silly idea is still alive, and with some people prevails, that goods from abroad are the better.

If this department had the encouragement both of the governing power and of the "sovereigns" that others have, our state would bloom as the

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rose; health and wealth would be ours. What do we need? What would I suggest? Well, first, that the value of the Horticultural Society be generally recognized. Second, that until an industrial building is erected by the state the Society be returned to its old quarters in the state-house. Third, that its working force be increased. Fourth, that its report be issued annually, supplemented by bulletins at the will of the Society. Fifth, that the salaries be raised to the dignity of other departments, and that a representative be allowed at state expense to attend horticultural meetings of value and importance anywhere. Sixth, that a better and more accurate system of statistics be devised. Seventh, that financial encouragement be given by the state to the tree planters.

Not even politics or alfalfa will make a state more popular and populous than a reputation for success in fruit growing. Fruit is always a happy subject in any country, clime or crowd, and the desire to grow and eat horticultural products is inherent in the bosom of every farmer and every adult member of his household. If our state legislative, executive and judicial departments continue to be made up almost exclusively of bankers, editors, teachers, attorneys and commercial men, whose means always supply their families with all the horticultural products they may desire, no matter where grown; then horticulture in our state has no great future, and Missouri and Arkansas will remain the land of red apples and our horticulturists have their reward only in the memory of their generous deeds and the good they have done. Shall the horticulturists "stand up for Kansas," or will they meekly submit and reward those who retard their work and belittle this Society.

THE SECRETARY'S REPORT.

By WALTER WELLHOUSE, Topeka.

Your present secretary took charge of this office on July 1 of this year. Previously some time had been devoted to the equipment of our new quarters.

After every consistent effort had been made by those most interested to retain the rooms occupied so long on the ground floor of the state-house, and following the order of removal, attention was turned to fitting up the new quarters as best they could be for our purpose with the means and influence available.

The Executive Council granted us rooms 6, 7 and 8 on the fourth floor; arches to connect these rooms were cut, walls tinted, new carpet and linoleum purchased, and new book-cases obtained. All members of the Executive Council helped or expressed a wish to help us; one member giving freely of his time to our assistance.

On July 1 the property of the Society lay piled promiscuously on the floors of our new quarters, where it had been placed by the custodian of the state-house. The work of bringing order out of this confusion—the sorting and arranging of books and cleaning and placing of exhibits—fell mostly upon the secretary and stenographer.

The examination of 1600 assessors' rolls, verifying the county abstracts, correcting visible errors and compiling statistics, took much time and correspondence.

A report of the yield of fruit for 1906 was compiled and sent to the principal newspapers of the state.

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In July, 300 inquiries were sent out over the state asking for a report on the fruit crop harvested or in prospect. Replies showed almost an entire failure of apples, pears, peaches, plums, and cherries. Small fruits were better. Reports by congressional districts showed the following averages: First district reported grapes 27, blackberries 66, raspberries 48, and strawberries 45 per cent. of a full crop; second district, grapes 40, blackberries 59, raspberries 54, and strawberries 28 per cent.; third district, grapes 21, blackberries 36, raspberries 29, and strawberries 12 per cent.; fourth district, grapes 27, blackberries 51, raspberries 43, and strawberries 22 per cent.; fifth district, grapes 14, blackberries 29, raspberries 18, and strawberries 13 per cent.; sixth district, grapes 7, blackberries 6, raspberries 1, and strawberries 16 per cent.; seventh district, grapes 95, blackberries, raspberries and strawberries each 13 per cent.; eighth district, grapes 37, blackberries 42, raspberries 12, and strawberries 11 per cent. Nearly all reported trees and vines as doing well. A large and excellent fruit crop was promised until after the unfavorable weather in April and early May. Apple trees in the vicinity of Topeka were in full bloom on April 6, fully two weeks earlier than the average time for putting forth blossoms. On the nights of April 9, 12, 13, 14, 17, 30 and May 4 ice formed from one-eighth to one-half inch on still water. Snow to the depth of 2.3 inches fell on May 4. This season shows the most complete failure of tree fruits known since Kansas trees began bearing.

Card indexes have been made giving the names, addresses and number of trees of nearly 4000 fruit growers of the state. This has been done that grower and buyer might be more easily brought together, and to provide a mailing-list for sending out information and inquiries.

An indexing and classifying of all information contained in reports, bulletins and books of this office has been begun and will be finished in due time.

There has not been the time to attend as many horticultural meetings as desired. Some of the orchards and fruit growers of the Arkansas River valley were visited. Trees were looking well, the growers were generally hopeful; but there was no fruit Fruit-trees appeared very thrifty and were full of promising fruit-buds at Garden City, under irrigation. It had been supposed that fruit-trees under clean cultivation for any great length of time would use up the humus in the soil and become pale of leaf from lack of nitrogen; but it was not so here. The leaves on the trees that had had clean cultivation for fifteen years were of a very bright glossy green, showing that there was no dearth of tree food.

At the fairs attended the exhibits of Kansas apples were confined to a few plates, most of which were from the crop of last year. Some creditable collections of grapes were shown.

Since July 1 there have been sent out from this office over 5000 circulars, cards, reports, programs and letters, besides information given out personally.

The matter of imitating cider vinegar was taken up with the state chief food inspector and information obtained to the effect that no misbranding of any vinegar would be allowed by that department. Later an order was promulgated, forbidding the coloring of distilled vinegar, holding that it was illegal, in that it was done to imitate cider vinegar. Cider

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vinegar will now have a chance to be sold on its merits, without competing with a cheap imitation. This vinegar has now advanced to a price at which it can be made at a profit by the orchardist, and the price of cider apples will undoubtedly be increased by the demand that will thus be created for them.

S. T. Kelsey, of Saginaw, N. C., honored our office with his presence on December 2. Mr. Kelsey is the last surviving charter member of our Society.

We announce the death of Prof. Elbridge Gale, at his home in Florida. Professor Gale was a member of this Society for many years, and was its president from 1874 to 1886—twelve years. He was always an enthusiastic and efficient worker in the cause of horticulture.

Another milestone in our journey of progress has been reached—the time when we meet to learn each from the other what is known of horticulture, gleaned from personal experience and observation, to delve deeper, just a little, perhaps, but yet deeper, into the knowledge that we desire so much to possess—into the laws and workings of nature, that we may grow more and better fruit, handsomer trees and shrubs, and lovlier flowers. One who is high among the many of our countrymen who have gathered useful horticultural and agricultural knowledge from nearly all parts of the world, said to us, when first starting on his useful career: "If I can go just a little deeper into the secrets and methods of nature than any have hitherto gone I will consider my life well spent in the search." And thus it is. We are trying to get more knowledge and more facts; and it is felt that no one should have the learning singly, but that to all should be imparted the knowledge possessed by each; therefore, let us ask questions and give our experience freely. Let us go back and cull the best from our combined experience in selection of soils and varieties, in planting, cultivating, pruning, spraying, packing, storing, and selling; and let the knowledge thus gained be applied carefully and thoughtfully.

The average horticulturist cannot take the time and risk involved to plant and prove untried varieties, however promising. But he can select scions and buds from trees of standard varieties that have been carefully noted in previous years, and marked for their good qualities as to form, vigor and freedom from disease in tree, and size, color, productiveness and quality of fruit. In this way no risk of loss is involved, but the chances are good for improvement; some have thought it better to build on fixed varieties than to trust to cross-breeding. If there is not the time or inclination to do this grafting or budding, perhaps our nurserymen could be induced to do it for us. One prominent fruit grower of our state is doing this, and, with his painstaking methods, is on the road to great success.

We have in mind an apple orchard which has borne crops almost continuously, producing in one season a crop that sold for $200 per acre, while a neighboring orchard, not more than a mile distant, which had been given equal care, has hardly paid for the planting. A member of our Society reported at one of our meetings a single apple tree from which had been sold seven successive crops for the sum of $328. The raising of a thousand such trees would be worth the effort of a lifetime, after paying well for care, fertilizing, spraying, and perhaps irrigating. It is true that safety does not lie in drawing conclusions from a single tree or from one orchard, but in the

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above are conditions that would pay for the closest investigation. Why is it that the one orchard produces so abundantly, while the other, under apparently same conditions, is a losing proposition? Why does one tree under favorable environments yield more than many under ordinary circumstances? Could we but have the factors which cause this difference of production and apply them, Kansas orchards would show a better average of fruitfulness. Are not these factors narrowed almost to soils and heredity in above cases?

There are many bright men employed by the state and United States who are solving some of the perplexing problems for us, but there is much for them yet to accomplish that is beyond the ordinary fruit grower. In the meantime let us stand shoulder to shoulder, kindly helping each other, as best we may, over the difficult places.

There should be, somehow and somewhere, a place provided for testing promising seedling fruits. The Stayman Winesap is fast becoming a favorite both east and west; the Kansas raspberry is well and favorably known beyond our borders, and others are bringing success; but, undoubtedly, many have been dropped by the wayside and are out of the race through negligence or the inability of the propagator to prove and bring to the notice of the public their superior merits.

Necessarily, most of us put fruit growing on the basis of dollars and cents; but sometimes the stimulus of the enthusiastic theorist is needed to pull us out of the ruts into which we have fallen. You that have attended our meetings often probably do not get many new facts at any one gathering, but one always goes home with a resolve to do more and better things. If these good resolutions were allowed to materialize, more, better and fruit would be the result.

How much has the vitality of the tree and fruit to do with resisting disease? Ben Davis is supposed to be immune from scab, yet we have seen it scab badly where the vigor of the tree was weakened. How much have the poor roots of the Missouri Pippin to do with the susceptibility of fruit and leaf to the attack of the scab fungus? The top-working of the Missouri Pippin on trees with better roots is being watched with interest. One man is planting his entire orchard to Northern Spy, expecting to top-work with desirable varieties when his trees reach suitable age. It is his purpose to secure the best root system possible.

We know certainly that Kansas can raise fine fruit, and that our apples are preferred in the markets over those from many other localities. We should use every effort to sustain our reputation as producers of good fruit.

THE TREASURER'S REPORT.

By Ed. G. Hoover, Wichita.

July 10, Received from former treasurer, Walter Wellhouse $556 22

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REPORT OF THE ENTOMOLOGIST.

By Prof. S. J. Hunter, Lawrence.

In the meager fruit crop this year we will have, I believe, an illustration of the old adage that "it is an ill wind that blows nobody good." It will be most interesting, at any rate, to note the relative numbers of fruit-inhabiting insects next season as compared with years in which the fruit crop is normal. And so, instead of talking to you upon the insects of the year, it seems to me the brief time I am to take can be more profitably spent in discussing the Entomological Commission and its relation to our work in horticulture in this state.

This commission was created by the last session of the legislature in a bill framed by Senator Stannard and passed under his direction, with the cordial coöperation of Secretary Wellhouse and many of the horticulturists of our Society. The commission is made up of five officers. The secretary of the State Board of Agriculture is chairman, the secretary of the State Horticultural Society is secretary, the professor of entomology at the State University, and the professor of entomology at the Agricultural College are members of the commission; the fifth member is a nurseryman appointed by the governor. The present personnel of this commission is F. D. Coburn, chairman; T. J. Headlee, Manhattan; S. J. Hunter, Lawrence; F. H. Stannard, Ottawa; and Walter Wellhouse, secretary, Topeka.

The purpose of this commission is both agricultural and horticultural, and in the rules laid down it covers three lines: Insects beneficial to agriculture and horticulture, insects harmful to agriculture and horticulture, and the inspection of nurseries annually and orchards by systematic survey. The purpose of the whole is to systematize the entomological work of the state, both agricultural and horticultural. From the horticultural standpoint, in addition to the examination of nurseries annually, there will be a systematic survey from year to year of the orchards of the state.

I had hoped that it would be possible for Professor Headlee, my colleague in this work, to be present to-day and occupy a part of the time assigned to this report. In talking the matter over together, however, we thought that probably the interests of the commission, as well as that of the Horticultural Society, could be better conserved if he would represent us at a meeting of the national horticultural inspectors, and also the economic entomologists, at Chicago. He is there now, and that accounts for his absence here.

The promiscuous sale and distribution of nursery stock of unknown condition of health is a menace to the horticultural interests of any state. The average fruit grower is not expected to be able to detect those unmistakable evidences of plant disease or injurious insects upon trees which he has just purchased; consequently, he is likely to set out trees, to learn some two or three years later that he has been fostering some plant diseases or insects which are likely not only to curtail or destroy the usefulness of the trees but also disseminate such diseases and insects to other orchards. There have been several public sales of nursery stock in this country in which the bill of sale states that the trees to be sold were infested by pernicious insects. It is to protect the horticultural interests, then, that practically every state in the Union has a law similar in purpose to the one now in force in Kansas.

It is not necessary to take up your time in a discussion of the details and

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workings of this law, since the secretary has here on the desk a large number of copies of the law, and each one of you should take a copy of it and become familiar with its requirements in order that you may take advantage of its provisions.

I prefer to speak more in detail concerning your coöperation in the work of this commission. We are now preparing a circular which will be sent out widely throughout the state. This letter will, among other things, ask tree owners to examine their orchards and grounds and send to the entomologists of this commission any insect, or anything which bears the appearance of an insect, apparently injurious in its character. This request has special reference to certain insects which adhere to the bark of the tree throughout their whole life. To equalize and facilitate this work the state will very probably be divided, so that one entomologist will look after the work in one part of the state and the other in the other part of the state.

The territory tributary to Manhattan, from which all inquiries should be sent to Professor Headlee, contains all counties north of the Kansas and Smoky Hill rivers and all counties through which these rivers flow, except Douglas county and that part of Shawnee county south of the Kansas river; and it also includes Wabaunsee county.

The territory tributary to Lawrence, from which all inquiries should be sent to Professor Hunter, contains all counties south of the Kansas and Smoky Hill rivers not penetrated by these streams, except Wabaunsee, and it also includes Douglas county and that part of Shawnee county south of the Kansas river.

In the first place, with the meager appropriation of $500, it is obvious that we could not go very far in the matter of personal survey of the orchards of the state, and so this is the means we are taking to reach you at this time. If you will respond readily the benefits accruing will be very much in excess of what you might expect. A good illustration of this is the following: In 1898 the Department of Entomology of the University of Kansas sent out 13,000 circular letters, asking that trees, plants and shrubs be examined, and that anything of a suspicious nature found thereon be promptly sent to the University; and, as you may suppose, this resulted in many samples of bark and twigs from these trees being sent. The outcome of this was the discovery on one place in the state of the presence of an insect which has caused the horticulturists of the United States a good deal of concern during the last fifteen or twenty years. The discovery, however, was most timely, since the infested tree—a pear tree—had been but recently brought from New Jersey. There were but a few colonies of the injurious insect inhabiting the tree. The tree was taken up and burned and that orchard was examined for a number of years successively thereafter, but that species of insect was not discovered elsewhere. Now, from the nature of the insect and its ability to spread, it seems entirely reasonable that if its discovery had not been made, by this time there would have been a serious case of infestation in that vicinity. I may add that for a number of years afterward no one knew, other than the owner and the speaker, that there was any trouble in the orchard where this injurious insect was found. I like manner it is now entirely possible for you to avail yourselves of this opportunity to check any incipient diseases or injurious insects about to become prevalent.

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In talking with horticulturists we have found them a little backward about making examinations in quest of these highly contagious diseases and noxious insects. They seem to fear that publicity will be given to such if found, and that their farm and their locality will receive unfavorable mention. Such matters, allow me to assure you, are considered entirely confidential, and an illustration of this fact I have just cited.

I have brought with me this morning some twigs covered by one of the insects highly inimical to horticultural interests, to enable you to gain the more readily some idea of the general appearance of the infested barks of trees. Already some of you are beginning to question whether these are still alive. These pieces of wood were cut from a tree nearly two years ago, so that it would be entirely impossible for these insects to have existed that long without nourishment. In your examination of these branches I wish that you would note how completely the bark is covered, plastered, you might say, with the bodies of these insects, overlapping one another in some places several deep. The injury to the tree is not alone from the loss of sap drawn by the insect, but inability of the bark to perform its usual physiological functions.

Both Professor Headlee and myself will be glad to hear from you from time to time, and will endeavor to coöperate with you in every way possible looking to the advancement of horticulture in this state. Matters of general policy are determined by the commission in session. It is now your privilege to avail yourselves of the coöperation of this commission.

MR. TREDWAY: I am not in the habit of making public talks. It would be to my liking, if it were not for the fact that when I see all you fellows looking at me I forget what I want to say. I wanted to express my satisfaction at these combined reports, or rather these several officers' reports. In all deference to the splendid officers who have heretofore managed this Society, it seems to me that, taken as a whole, we have a class of reports here that will give prestige to this Society. I will be glad when I see these reports in print. At our meeting a year ago on the floor of this hall our honored president, at his election, told you that the presidency of this Society was but a figurehead. In a great sense that was true. I sat next to Brother Phillip Lux, I believe it was, and we said "it will be a figurehead no longer." I can see already the workings they are entering upon—this work of our Society through the head of this institution, as well as through the secretary and other officers. In all those reports, Mr. President, it seems to me I was more peculiarly struck with the report of ex-Secretary Barnes, because it was suggestive, at least, of measures that are needed and may be adopted for the good of the Society. It brought to my mind this fact: that we might get in touch with the teachers of this state, who are now in annual session, as well as with others, and I wished then within my heart that our secretary had thought to induce a place on that teachers' program for the name of Hon. Edwin Taylor, our president, for a talk before that meeting. I was at the meeting in Fort Scott—I believe it was fourteen years ago—when our honored president was elected secretary of this Society and our greatly honored ex-President Wellhouse was made its president. I had no acquaintance at that time with Mr. Taylor, and I have learned through all these years to know who he is, and when he was an-

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nounced as our president last year I thought our Society would take on new prestige.

On our program I read that no society shall be entitled to more than two delegates. Down in Allen county we have a society that I believe has a good record on your list, and we have a membership of probably 250, and you won't let but two of us come up here. I came up here as an alternate, but was made the delegate. We have a full delegation from our society, and always have. Grant us a half dozen delegates, if you please, and we will be here. I was raised a horticulturist—I was going to say a farmer. It has been my life-work, and I love the farm. I think sometimes I will go west and start anew, simply that I might improve a new farm again. I am sorry that the improvements on my place are not better, but I cannot do it now; I must quit. I have many times gone in debt for the purpose of experimentation—expended much money in that line—so very naturally I incline toward you people. We go into the legislature, and we find there many lawyers. They do not care anything about us. We find doctors there looking after their interests. I am looking after the horticultural interests.

COLD STORAGE.

By F. W. Dixon, Holton.

The first essential in successful cold storage is good fruit. One thing must be impressed on your mind, and that is that the apple becomes no better after being placed in cold storage. From my observation I have found that most failures in cold storage can be traced to this one fault. My own experience has been rather limited, but what little I have had I consider successful.

The first apples I ever stored was in the fall of 1902, in a small storage plant in our own town. I kept a close watch on these apples and on the temperature of the room. The storage people tried to keep the temperature of the room as near to 31 degrees as possible. About Christmas time of that season we had some very cold weather, and the day before Christmas I went to the storage plant to get some apples for Christmas use. I found the thermometer standing at 28 degrees, and on opening some of the packages I found the apples frozen. I was just a little bit excited, but thought I would keep cool and see results. Of course I ordered the temperature raised at once. A short time afterward when visiting the plant I found the temperature at 32 degrees and the apples in apparently perfect condition. Some of these apples were kept in storage until May and yet showed no signs of scald—the one great trouble in storage apples. There may have been reason for this. The fruit I put in storage that year was first-class in every respect, except that it was a little undersize. We picked, barreled and put them in storage almost the same day, none of them being put in later than the morning after picking, which may have had a good deal to do with the condition of the fruit when taken out. When these apples were sold and removed from storage there were few barrels that required plugging, and it was an exception to find a barrel with a single specked or rotten apple in it.

The seasons intervening between 1902 and 1906 I sold my apples from the orchard and had no personal experience with storage. The price being low in 1906, I made arrangements for storing room. Our home storage room

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being all engaged—being very small and could only store a few hundred barrels—I engaged storage in Kansas City. I tried to pack only strictly No. 1 apples, and I think I succeeded better than most of the people who stored apples. I made several trips to the storage plant during the fall and winter and inspected the apples each visit. I found that they were keeping very nicely. At each visit I found the temperature from 32 to 34 degrees; this was the temperature the storage people recommended. I sold my apples the latter part of February. The man who purchased them went to the storage plant with me and we examined a number of barrels from each car and found that there was little or no repacking to be done. We found that the Missouri Pippin had more poor apples than any other variety at that time. Some of these apples were not removed from storage until May, and at that time brought top prices. We made arrangements with the storage people to send us a report on every car removed, whether repacked or not, and the amount of loss in repacking. One car, removed the latter part of April, containing 200 barrels, was repacked with a loss of 10 barrels, and the storage people stated that they were very fine apples, mostly Ben Davis. When these apples were removed from storage quite a good many showed signs of scald; not enough to do any harm, but enough to show that all was not right. As to the cause, I have only a guess. The apples were generally picked from four to six days before being placed in storage, this time being required for transportation. One car was out ten days and showed the most signs of scald.

While at the storage plant during the winter I had occasion to observe different packs of apples. On one occasion I noticed a car of apples being repacked and the loss was fully two-thirds. Of course there is no profit in any such apples. From my experience I would advise the grower to pack and store his own fruit unless he could receive a very satisfactory price at picking time. I do not see where it is possible to run any risk if he has the right kind of fruit. The storage people must be particular to keep them at an even temperature or they would suffer great loss. They have the machinery and the men to look after the business all the time. If the coming season should prove to be a good apple season, I shall certainly use cold storage.

A MEMBER: I would like to ask Mr. Dixon the temperature of apples put in barrels, if he can remember the temperature that day. He said that their barrels were stored, I think, the same day they were packed. Now, some of our growers have found it makes considerable difference with some varieties. Say if the thermometer runs up to 70 or 80 degrees in the afternoon, some of them are of the opinion that it would be better to cool those varieties before sending to storage.

MR. DIXON: It was not very warm; warm days intervened between my shipping them and their arrival at the storage.

PRESIDENT TAYLOR: I would like to ask Brother Dixon how he would find everything next day, when it was 70 or 80 degrees.

MR. DIXON: That has been left to storage men, to see that they were not brought down too fast.

PRESIDENT TAYLOR: Do you mean that they would have supplemental storage room?

MR. DIXON: Yes, sir.

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PRESIDENT TAYLOR: Do they?

MR. DIXON: They do in some places in the East.

MR. MINER: I can give a little experience about the storage question. We have two large storage plants right in town, and all our orchardists that store, store there. Practically all the orchards are six miles from town, and the apples are stored as soon as they are packed. Those apples packed in the forenoon are hauled in the same day. The apples are practically put in storage in twenty-four hours after they come from the trees. They have no time to wilt or change, and we have found that our apples keep better than a good many others do. We do not think they keep near as well where they are put right in the storage. Of course, the apples are not put right down to thirty-two degrees the first thing. They are allowed to cool. That cooling must be done properly. The apples came in with such a rush, sometimes, that they simply put them into cold storage. It was probably two or three days before they got them down where they really wanted them. I will say that our apples keep perfectly in cold storage. I think our cold-storage men keep the thermometer about thirty-two degrees, or as near that as they can. Apples taken out of cold storage will come out practically the same as they go in, unless it is very late in the season. Of course, your Grimes' Golden and your Jonathans will get soft in February. If your apple is overripe it will not keep as well as if properly ripe, but they should be put in when they are ripe and just hard and firm, and then the temperature should be kept uniform. No. 1 apples were taken out in February or March practically as good as when they went in. Of course, you cannot put in a poor apple and take out a good one. We now have apples there that were brought from the West and put in cold storage. I do not think they will keep as well as if they had not been kept out of storage so long.

MR. DIXON: This cooling, taking, perhaps, thirty-six to forty-eight hours, has put that good Kansas apple, York Imperial, among cold-storage apples. They have at Hutchinson practically obviated the danger of scalding, and the cooling of this variety first before bringing it down to the storage temperature practically eliminates that danger.

PHILLIP LUX: I would like to ask if there is any way we can induce our storage plants to cool our apples. I have noticed, as a rule at least, that there would probably be a dozen or fifteen different parties storing apples, and their apples all go to the same room. The first man that comes gets in there first. Now, how are those apples going to be cooled if there is such a thing? How are we going to manage to obviate that difficulty? Our York Imperial came out last year pretty badly scalded along in February. Ben Davis and other varieties came out very nice the first of May.

J. W. ROBISON: I have not had a great deal of personal experience in cold storage, but I think from what little experience I have had that it is very good, and I think that it can be better regulated by the cold-storage men by having receiving-rooms, where they unload the fruit, that could be kept at a somewhat higher temperature than the permanent rooms where they place the apples. In some of the cold storages that I am familiar with they have different rooms, with different temperatures, that they put the apples in, claiming that all varieties do not keep equally well at the same temperature.

I may say, not having any apples this year, I sent up to Iowa and got a

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car-load from a friend there. In that load were Jonathan, Grimes' Golden, Baldwin, and quite a number of other apples grown about Omaha. They came out of the cold-storage plant there and were shipped here and went into the cold-storage plant at El Dorado. Even moving in the midst of their term in cold storage does not seem to have affected their keeping at all. I opened some Baldwins, and they were getting a little ripe for this time of year. I find that the Baldwins are in perfect condition to-day, grown in Lewis county, Iowa, and shipped down here. We do not generally want to go so far north to get apples. They were held back in their blooming there this year, and they had about two-thirds of a crop—about seventy per cent., I think—of the finest apples they ever had there. In those apples I have not seen one live codling-moth. There were a few indications that they had worked. The orchard was sprayed, and sprayed thoroughly. It has been said we should put in No. 1's only. It is best not to raise No. 2's at all, but we do it sometimes, and when we have them we have to do the best we can with them. We cannot have everything in this world just as we would.

PRESIDENT TAYLOR: Let the chair put in a word or two in reply to Colonel Robison. This fall, in El Dorado, and any other old place, they can pet their apples as much as they like, but a year like last year, unless it would be in El Dorado, and possibly in Hutchinson, there is no place where apples are put in a preliminary room; they go right straight up in the room where they are to stay. I have seen them go in.

A MEMBER: I should like to ask if there is a possibility of making any preliminary arrangements for shipping 200 or 300 miles.

PRESIDENT TAYLOR: By shipping them in an iced car you can cool them out to some extent. It will cost you fifteen dollars to fill it with ice.

SECRETARY WELLHOUSE: I only want to say just a word. This gentleman asked about cooling cars. We have done that, selling the apples from the orchard and loading them at our station, having the railroad company place refrigerator cars on the track already iced, and we have sent them to New York in that way, where they arrived in good condition; such varieties as Jonathan, that were picked during warm weather. In regard to the temperature in cold storage: Our experience has been that it is damaging to the apples to have them cooled too suddenly. One firm that had stored a great many apples for us had a rule to put the apples in an ante-room that was cooled to about 30 degrees less than the outside temperature, and afterwards brought them to the required degree of cold, 34 degrees usually. Other storage men said they had experimented with them and found that a change of 30 degrees was about the thing. For instance, if you picked apples on a day when the temperature was 80 degrees, then they ought to be put first in a room of 50 degrees, and as soon as the apples reached that temperature they should then be moved to a room where the temperature was 34 degrees.

A MEMBER: What was the result?

MR. WELLHOUSE: Our apples kept well for us.

GEO. W. HOLSINGER: I remember at a recent meeting of the Missouri Valley Horticultural Society, we had a Mr. Vining there to talk to us about cold storage. It was his experience as a cold-storage man that the best success with apples could be had by bringing them down as rapidly as possi-

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ble. He thought it would take at least a week to cool apples in barrels to 33 degrees, the proper temperature for the storage rooms. His notion was that apples which spoil in cold storage are those kept too long in a high temperature before being placed in the coolers; the life and keeping qualities are thus injured. If this is true, and we must pin some faith to what Mr. Vining says, they ought to be cooled before they are brought down to their storage temperature, unless put in cold storage immediately.

PRESIDENT TAYLOR: That is like spraying, and some other things; different men differ in respect to it. You know those Californians who have the best success with shipping their fruit in refrigerator-cars put it in a preliminary cooling house before they put it in the cars, and have it thoroughly cooled off. It has to have forty-eight hours partial refrigeration before it is put in refrigerator-cars. They consider that very important. All the same, our apples do not get any partial refrigeration. They go right into the room where they stay. If you do not think it, you can observe.

PROFESSOR SMYTH: I would like to ask if the reason for cooling those apples before putting them in the refrigerator-car is not on account of the effect it would have on the temperature of the car, and nothing more or less than the car.

PRESIDENT TAYLOR: It is quite likely, professor, that is the explanation.

E. B. COWGILL: In reading the *California Cultivator*, in reference to this preliminary cooling, they emphasize first the advantage to the fruit from the cooling; second, economy in expensive icing of the car. The one icing carries them through if they are already partially cooled. But the first point they make is that the fruit is very much firmer and comes out better on account of the cooling in the storage house.

MR. MILLS: My experience shows me conclusively that if you pick your apples and get them into cold storage quickly, even if they are picked in warm weather, the apples keep almost perfectly. I only had ten dollars shrinkage on 1000 barrels.

PRESIDENT TAYLOR: This is Mr. Miner's conclusion also. I think it is borne out by every one else who has gone over the ground.

MR. HADLEY: In last year's storage we could not keep up with our pickers; had entirely too much to do to get them into storage. Then came three or four days of rain, so that we could not handle them, and they had to remain in the shed for that time, and there was no difference between those put in three or four days after they were picked and those put in the same day. So I would take it that it is the quality of the fruit and the packing proposition more than being put in the same day.

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COMMERCIAL GARDENING.

By A. V. WILSON, Muncie.

Gardening has ceased to be one of the side-issues of farming. Rapidly it has developed from small proportions to a business that involves immense capital to operate and requires men of intelligence and stability to keep up with the demands made by the public for fresh, crisp, inviting vegetables.

To meet the demands of the various markets, growers and experiment stations have been stimulated to search for the choice varieties and best methods, in order to produce the desired results. This research has grafted into gardening a degree of pleasure that, to the true lover of nature, eliminates much of the drudgery heretofore connected with the business.

The successful grower of fruits lives very near to nature; and as the years roll by his love for the tree and the vine becomes deeper and more lasting. There is a fascination in watching the trees spring into life, bud, blossom and produce fruit. There is the same attraction in planting the tiny seed of the vegetable, cultivating, and nursing it to produce in abundance.

Who, then, are better fitted to become the commercial gardeners of the world to-day than the commercial fruit growers?

These two departments of horticulture go hand in hand, and it is the purpose of this paper to show that the two can and should be made one.

The fruit grower this past season who had land available for the growing of some one or more vegetable crops found, at the close of the season, a balance on the profit side of the ledger. Whereas, had he depended wholly on his fruit crop, which in some cases was almost a total failure, he would have been compelled to face a disagreeable financial condition.

Naturally, if we include gardening in our operations, we ask, What crops shall we grow? This, to be sure, depends mainly on one's location and markets. But if we will consider the general conditions, as they exist to-day, it will to a large extent answer the question.

The tendency for gardening is creating a demand for smaller farms. It follows, then, that farming will be more intensive. Growers will tend to produce less amounts and greater varieties. This being true, we may naturally expect that there will be an increase in the supply of such vegetables as peas, beans, radishes, lettuce, beets, cucumbers, and the like. On the other hand, on these small farms there will be a decrease in the acreage of such vegetables as potatoes, cabbage, tomatoes, sweet corn, horseradish, and vegetables of this character.

The last-named vegetables belong to what we may class as heavy and bulky. The former belong to what we may class as light and more easily handled. Under the light class we have vegetables that must be used almost wholly while fresh. Outside of peas and cucumbers they are but little converted into by-products.

Such vegetables must be handled with care and marketed quickly, and often they do not pay for the labor necessary to produce them. The demand for this class during the summer season often seems to move in waves, and prices fluctuate more readily. Markets are easily overstocked. Markets are not often overstocked for any length of time, and even when in this condition the stock can often be held until the market clears and losses be avoided.

Under the heavy class almost the opposite condition exists. The demand

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is by far more even and extends through the entire year. The demand for vegetables under this class is increasing, both to be used while fresh and to be converted into by-products. Still another important factor in growing vegetables of this class is that they can be transported to other sections to better advantage and with a greater degree of safety than those under the lighter class.

With the fact before us that the small farmers will not devote their proportionate acreage to these heavy vegetables, but rather leave it to the growers who can plant more largely; also, that such crops can be planted, cultivated and harvested with less hand labor and thus be produced more economically, we must conclude that, for the general crops, it is to this class that the fruit-grower should devote his energy.

Our attention now turns to that of location and preparation. As fruit growers, we have already learned to plant our fruit on the high elevations. This leaves the valleys or lowlands for our vegetables, and this is where they should be for best results. However, in selecting such land, good drainage should not be overlooked.

Vegetables are great feeders, and I do not believe that it is possible for any of us to get our ground too rich. We must fertilize if we expect to keep up fertility and produce paying crops. There is no fertilizer that will supply all our needs like good barn-yard manure. During the past year we tried commercial fertilizers; in some cases we noted good results, in others we could not see that anything had been gained. The greatest results were noted on potatoes; the least on corn. While we believe that there is some value to commercial fertilizers, yet, to be profitable, we should know just what elements our soil needs and then supply it liberally.

We cannot depend on commercial fertilizers alone. Humus must be supplied in some form, and if manure is not available in sufficient quantity, then some green manure crop must be grown and turned under.

Deep late-fall or winter plowing for all garden truck is much better than spring plowing, for many reasons, which I need not here enumerate.

Our rules for planting are about as follows: Plant potatoes deep and just as early as the ground will permit. Extra early Adams corn will stand a good deal of rough weather; plant early, but not too deep. Early cabbage will stand quite a freeze and almost any amount of frost. Use good, strong plants, and transplant in the field just as soon as the ground is dry enough to work.

Tomatoes are too tender to transplant until all danger of frost is past. Let the ground get good and warm; nothing is gained by transplanting tomatoes in ground that is cold. The idea that tomatoes do best on rather poor soil is a mistake; they will ripen a little earlier on such soil, but will not produce as many or as fine tomatoes as when grown on good, rich soil. If the soil is so rich that they are inclined to run to vine, be a little rough with them and so check their growth.

Up to the maturing of the crop the work has been easy and delightful. We are now confronted with the most difficult task of the whole business, that of disposing of the product. I am frank to say that any of us can produce some kind of a crop, but very few seem to know how to prepare it for market and sell it to the best advantage. A poor salesman will more often cause a decline in the market prices than will overproduction.

Remember this: that your reputation for the production of choice veg-

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etables is just as vital as your reputation for fancy fruits. It is just as possible to receive an extra price for a fancy, uniform-size bushel of potatoes or basket of tomatoes as it is to get it for a box of fancy apples.

If you are located near a city where you can market your produce from your wagon, you will find that if you prepare your vegetables with the same care that you do your fruit, and be honest all the way down to the bottom of your basket, you will have a trade that no one can take from you, and your produce will bring a premium over the average market.

The same rule holds true if you are shipping to other markets. A package rightly packed is half sold, and is an invitation to buy another. It is always advisable, before planting your corn to know to some extent where and how you will dispose of it. Make all preparations before the time of harvest. What might be serious losses are often avoided by looking ahead.

To some, a good outlet for their vegetables is found in the canning factory. While prices paid by these factories is not nearly so inviting as those received from other sources, yet there is some advantage in growing crops for them. If the factories are near at hand not much care will be needed in packing or handling the crop, the main point being to produce the greatest bulk at the least expense. Very little is needed in the way of packages, and many items of expense are saved. To be profitable, the acrage should be as large as possible, so that when the gathering comes it will require steady hauling to the factories. In this way the extra help can be fully employed. There then will be no loss of time or crops in having to stop and hunt for help when needed, or take chances on getting them just when wanted.

Here we might stop, but to me the most fascinating part of commercial gardening, that which requires the most skill and gives the most delightful and profitable employment during the winter months, is that of gardening under glass. In fact, no commercial plant is complete without greenhouses to a greater or less extent.

The West is behind in this department. While it is true that near the larger cities we will find plants of this kind, yet the production is confined largely to lettuce. Nearly all the other winter vegetables sold in the West come from Boston and other eastern points. This need not be; our growers are just as expert as any in the East. But the drawback has been that there is not the demand here for these winter novelties that there is in the East, or even as far west as Chicago. Nor have our people been willing to pay the prices necessarily asked in order to make it profitable or justify the grower in the risk. Slowly these drawbacks are being overcome; we are finding that we have many points in our favor over our eastern neighbors, the most important one being a greater per cent. of sunshine, which counts for so much in successful winter gardening. When we awake to our possibilities we will find that the North and West will prove profitable patrons. We need have no fear of the much advertised garden spots of the South. No doubt they are all right, but they are too far away to ever supply our northern markets with fresh fancy winter vegetables such as we can produce here under glass.

The demand is increasing, and there need be no fear of overproduction in this line. With an increase in the supply will come more economical methods of production, which will compensate for any decrease in price.

Now do not let us get into our minds, if we take up this department of the work, the idea that all we need to grow winter vegetables is a building

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covered with glass and heated the cheapest way possible, and all we have to do is to plant and harvest. Nothing of the kind. To begin with, this is going to be an expensive proposition, and if one is considering the building up of a commercial plant, begin on a small scale, for there is much to learn. No matter what the size of your plant, build it as modern as if you were covering acres. Study greenhouse construction and management before you begin; it will save many mistakes, but experience will be your best teacher.

The more we know of this class of horticulture the more it will unfold to us its possibilities, and prove one of the delightful departments of our work.

I have said nothing of the crops we can grow during the winter; let that be according to our fancy, except this one; we can all grow it with little expense, it needs no greenhouse, and but little artificial heat. It is always in demand and profitable, and always relished on our tables. I refer to pie-plant, or rhubarb. Without going into all the details, a common dug-out or cellar, so arranged that any old stove can be set up for use on extremely cold days, with the floor covered from six to ten inches deep with good, rich loam, without any manure, then set with the crowns taken from old plants dug late in the fall, they will produce successive pullings at very little expense of labor.

In conclusion, let me urge the fruit growers to carefully investigate the possibilities of commercial gardening in Kansas.

We are so located that when our crops mature we have good markets on all sides. We have not been supplying them. Points more distant have been taking this business from us.

Are not we in this branch of horticulture facing an open door of opportunity? Is it not enough for us to say, Shall we enter?

MR. SNYDER: I desire to call the attention of the members to a fact which perhaps most of you are already aware of, and that is, that we have very many real friends among the statesmen of Kansas. I mean by "statesmen" men of the legislature. You know some of them meet us with a glad hand, but when we ask something from them they give us the marble heart. We are glad to say that is not true of all of them. There are those who are friends of the horticulturists, and one I desire especially to refer to, viz.: the active horticulturist always with us and always ready to do anything we can show him he ought to do for us in the legislature. That is the Hon. J. T. Tredway; and I take pleasure in making a motion, Mr. President, that as a tribute to his work for us and his interest in our welfare we place him upon the rolls as a life member of this Society.

PRESIDENT TAYLOR: I never had occasion to put a motion with more pleasure than this one. The motion carried.

MR. TREDWAY: You do me undue honor. This comes to me as quite a surprise, but I appreciate the great honor, indeed, more deeply than I can express. I feel, however, that I have simply done my duty, and nothing more than I felt was my duty. I did not feel in the work of a legislator that I was doing any class legislation, or attempting it. If you will pardon me, I will say, however, that during the two past sessions of the legislature, especially the last one, becoming acquainted with our members, I feel that I did have a little influence with them and helped draw them in our direction. I can only hope that I may have further opportunity in that way; but, rest assured that, to the extent of my power and ability, I will stand for the farmer and horticulturist.

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AFTERNOON SESSION.

FRIDAY, December 27, 1907.

Meeting called to order at 1:30 by President Taylor.

HEDGES AND TREES *versus* WIRE FENCES IN WESTERN KANSAS.

By DR. G. BOHRER, Lyons.

Kansas embraces a territory 400 miles in length by 208 miles in width, or 82,144 square miles. Of this area, 384 square miles are said to constitute the entire water area of the state, thus leaving a land area of 81,760 square miles, or 52,326,400 acres of actual land surface. And as there is not a mountain within the state, and but few rugged hills, to prevent any considerable amount of this vast area from being devoted to the cultivation of all the agricultural, horticultural and floricultural products susceptible to successful cultivation anywhere in the latitude where the state is located, it is safe to assume the ground that all the world does not afford another body of land of such a vast acreage as this so uniformly tillable. And as regards the fertility of her soil, an inspection of her products is all that is necessary to prove that in this respect she is seldom if ever equaled, and never excelled. Her water-supply for stock and general use is perhaps far ahead of any other territory of similar extent in all the world, there being but few localities where water in quantities inexhaustible and of excellent quality cannot be had.

During a residence of thirty-five years in Kansas the writer has never heard of a scarcity of water, while in many other states stock has to be driven long distances to water, or it must be hauled for miles.

The natural pasture lands are without a doubt unexcelled, and probably never equaled. The writer settled on a 160-acre homestead in 1873, in Rice county, 40 acres of which has never been disturbed with a plow. During all the thirty-four years that it has been in constant use, without any sort of cultivation, except to collect a part of the cow-chips and haul the same off to prevent their doing harm to the buffalo and bluestem grasses, both of which are indigenous to the soil, this 40 acres of grass has pastured more stock (horses and cattle) than any 40 acres of blue-grass, timothy or clover I ever saw pastured.

The total value of all of the farm products, together with the live stock of the state, aggregated in the year 1906 $424,334,000. And yet it is estimated that scarcely thirty-three per cent. of the state's area is under actual cultivation. It is probably safe to set aside 20 per cent. of the state's area as permanent grazing lands, or lands that will not perhaps be put under the plow for centuries, and possibly never; thus leaving an undisturbed area of 47 per cent. to be actually plowed and cultivated, which will raise the value of the entire annual product of the state from stock and other farm products to $1,000,000,000.

This, of course, does not include the value of the mining and manufacturing resources of the state, which in strict justice deserve a report with other noteworthy sources of income to our people, natural gas and oil having stimulated the establishment of factories to an extent that so far no one can correctly put a limit to, either as to permanency, or as to the number of factories or capacity of production yet to take place.

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One other important fact should not be overlooked, namely, the fact that the surface of the state is undulating and self-draining. So true is this that not a swamp of note can be found within her borders. This being the character of her surface, when coupled with her altitude, which is almost above the miasmatic portions of the country, makes her the best-adapted to the health of both man and domestic animals of any country of similar extent and natural resources in the known world.

The purity of both her atmosphere and her water being such that, where proper precautions have been taken to prevent typhoid fever and other disease germs from having access to water used for drinking and other domestic uses, typhoid fever is almost unknown, as well as other malarial ailments. Pneumonia is far less prevalent in Kansas than in most other states, and it is by no means the home of tubercular consumption; in fact, after a stay of more than a third of a century, I have never known of a severe case of hemorrhage of the lungs, but, on the contrary, I have known many persons who suffered from hemorrhages of the lungs in other states to locate in central and western Kansas and become robust and hardy.

The different kinds of farm produce that are common to the state embrace everything that is successfully cultivated in her latitude anywhere around the globe. As a wheat-producing state she leads all her sister states, both in quantity and quality; and although Kansas is not talked of as a corn-producing state, yet as far back as 1889 her yield was 273,888,000 bushels, which is more than any other state has ever produced. Until within the last ten years the cultivation of alfalfa had not passed the experimental stage, but now, including the large acreage sown the past fall (1907), we are safe in estimating the present amount at about 1,000,000 acres. Five years more is likely to show another 1,000,000 acres within our borders. It grows in every county in the state.

With the foregoing partial view of what has been done in the state during the forty-six years since Kansas was admitted to the Union, let us see what part has been performed by way of indispensable aid from fruit-trees, forest-trees, hedges and vines? To state definitely the per cent. of benefit derived from these sources in developing the agricultural, horticultural and general industrial pursuits of the state is scarcely within the range of possibilities. But it is a well-known fact that, simultaneous with the growth of orchards, timber belts and hedges, the benefits of rainfall have been more lasting. Corn grows taller when protected by timber in the way of orchards, groves of forest-trees or hedges, and holds its blades far better. During the '70's there was comparatively little corn cut or shocked for fodder, the blades being so nearly all blown away by high winds that it was not worth the labor required to save it.

In every part of the state, with the growth of timber in its different forms, and especially in central and western Kansas, have its benefits been demonstrated. Take away all the groves of timber, orchards, and hedges, and every argricultural and horticultural interest of the state will sustain an unlimited amount of damage.

During the early settling of the state, west of Topeka, the stars shone at night with the brilliancy of diamonds. Now, until we get out into the western third of the state, the atmosphere is hazy and the stars are seen through a mist of greater or less density, which is due to the plow and tree; the one stirring the soil, so that a large share of the rain that falls enters

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the earth instead of running off as soon as precipitated, while the trees check the spread and force of winds, thereby retarding evaporation, which is probably of greater importance in Kansas than in most if not all the states of the Union, for, as already shown, her water area is quite limited, there being only 384 square miles, so that there is a correspondingly small water surface from which a rapid evaporation of moisture can take place. Just to what extent this limited area of actual water surface may affect the amount of evaporation and precipitation of moisture within the state there is no reliable method of determining, but that it has something to do with it there is no doubt. I would suggest to every tiller of the soil the great importance of bringing into requisition every available means possible to aid in economizing the rainfall we get.

But, in the presence of all the foregoing incontrovertible facts, we find persons disregarding them and declaring that, if they had a hedge around their farm or a row of trees around or through the same, they would destroy them and substitute wire fencing, using the illogical and untenable argument that trees and hedges require too much labor to keep them in proper condition, and that they injure crops by absorbing moisture, and injure the ground far out in the field. While this is true upon the one hand, the important fact on the other hand must not be overlooked, namely, that a very large amount of very fertile land is sandy and will blow to the extent of serious injury to crops, in the absence of protection afforded by trees and hedges. This is also true of lands that are not classed as sandy, to a great extent. Aside from this, it is a well-known fact that a large number of horses and cattle are killed annually by lightning along wire fences. In addition to this, many horses are killed outright by wire cuts, while thousands of others are permanently blemished from this cause, and rendered unsalable except at reduced prices. In fact, if an accurate report of such losses were placed before the public, with other agricultural reports, it would show a state of affairs that at present is overlooked or ignored, and would point to gross neglect of duty by not at least having wire fences masked by a fringe of timber or a light hedge—in fact a state of affairs that in the light of reason and in behalf of humane protection to domestic animals suggests legislative enactment against such unjustifiable neglect, amounting to actual cruelty to domestic animals. Aside from this, when such protection is once established it brings with it the natural conditions favoring the germination, growth and development of every kind of tree, shrub, vine and plant that is of real worth to mankind, and in a degree far superior to the condition found by the pioneer settler on our bare prairies.

Ornamental shrubs, blooming and fruit-bearing vines, together with every vegetable in common cultivation in our kitchen gardens and in our city truck patches, which at first afforded but little encouragement in the way of financial income, are, under protection, proving to be highly remunerative. The same is true of every fruit-tree under cultivation in the state. In addition to this, it is proper to state that all of our field crops, before trees and hedges were grown, were not only injured by high and unobstructed winds, but the seed that was sown or planted was often blown out of the ground and carried away. In fact nothing of value that grows upon the farm will succeed as well without the protection of trees as with them.

Even alfalfa, which is probably the greatest drought and wind resister of all the plants of value that grow upon our prairies, succeeds far better

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on our high lands when sheltered by trees; not by being grown among the trees, for in such cases a death-struggle is the result, both trees and alfalfa grasping for moisture, and both suffering, until the trees as a rule perish for want of the moisture taken from them by the alfalfa.

As above stated, alfalfa is a great drought resister, but yields larger crops if well supplied by moisture. Trees on elevated lands retard evaporation and thus protect this as well as other crops. Trees and hedges will pay well for all it costs to plant and care for them, while the wire fence alone protects no crop by economizing the moisture we get by precipitation.

Referring again to alfalfa, it is perhaps not out of place to state that it is, with proper care, likely to prove one of the chief sources of income and profit to the state in the not far distant future, for the enormous acreage of wheat is from year to year costing more to harvest and market, so that it is becoming less profitable; besides it will at no distant day prove to be a soil exhauster, while alfalfa is a fertilizer, and affords by all odds the best known hay for dairy herd or almost any other stock, wherever tested. It is perhaps the best honey-yielding plant west of the Mississippi river, if not in all the world; and that pure honey is the most wholesome sweet in use among mankind is not questioned by the masses of our people who know anything about honey as a food in a state of absolute purity and free from glucose and other adulterations. It is now required to be pure under our pure food law, or it must be labeled as a blend.

Then, to view the further development of our vast amount of uncultivated but highly fertile lands from whatever reasonable standpoint we may, the fact stands out most glaringly that the future greatness of the state, as well as the interests of the sturdy, industrious, home-seeking pioneer, demands that shoddy and slovenly methods of agriculture, horticulture and floriculture, as well as other industrial pursuits of the state, be abandoned.

The wire fence, unaided by trees or shrubs, cannot by any means possibly afford such protection as is indispensable to that high degree of agricultural, horticultural and other kindred pursuits that the interest of our rapidly increasing population demands, and which the highly fertile qualities of our uncultivated lands merit.

As to the kind of trees to plant, I would recommend trees of dwarf habit to be set along our public highways and around fields of farm land. Osage orange, Honey locust, Arizona pine and Red cedar will grow well on elevated lands; Russian mulberry will answer a good purpose on bottom or valley lands. Where land is not adapted to the production of field crops, walnut, hackberry, catalpa, basswood, box-elder, Georgia poplar and cottonwood should be planted. But to succeed in growing trees along the public highways will not prove an easy task. The settler, in locating upon a farm destitute of timber, should fence a pasture lot, in order that his stock may be kept entirely away from his orchard and trees of any and all kinds that he may set out; and wherever a fence is desired, start a row of trees adapted to the kind of land to be fenced, as already recommended. If it is not meant to grow a stock-proof hedge, let the trees be set three to six feet apart, then cultivate properly until the trees are large enough to bear a fence wire, either barbed or smooth; the latter would probably answer as well or better than a barbed wire. One or two wires stretched along such a hedge will, as a rule, turn horses and cattle quite well, and not nearly so many animals will sustain injury or be killed, either by light-

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ning or wire cuts, while the hedge will prove of incalculable benefit as a windbreak, thus benefiting both stock and field crops.

To all this let there be one good windmill set at work on every farm, pumping water constantly, or as nearly so as possible, and not permit any of it to be lost. Let it be applied to the garden, the trees, the vines, hedges and plants. Many hundreds of windmills so put to work will bring to the surface large quantities of water, which will not only benefit growing vegetation, where directly applied, but will contribute to the humidity of the atmosphere all over the country. But it will be said that all this will require much labor, which is true, but not nearly as much as was required to remove the timber from the fertile lands of our Eastern states. And let it also be understood, that it will be quite as impossible to succeed in diversified farming in western Kansas without such protection as is herein recommended as it was to raise field crops in the heavy forests of the East with all the timber on the ground.

These facts seem to be overlooked by very many people, and hedges and windbreaks are actually being destroyed. And while an occasional hedge or row of trees may have been grown where it is not best to have it, to destroy them and substitute wire fences is an injurious step backwards and should be discouraged, and, if necessary to prevent it by legislation, let it be done.

I will, in conclusion, hazard the prediction that if such a course as I have outlined be adopted, and strictly adhered to, a hundred years from now will find more than three millions of people permanently located, with abundant means available for a comfortable support; in fact, more so than is the case in a number of our Eastern states. For with such protection, aided by raising an immense amount of water by pumps, added to the natural annual rainfall, the agricultural, horticultural and stock-growing resources of the state will be almost an absolute certainty, as will the yield of crops annually.

All this, let it be understood, is to be supported by strictly scientific tillage of the soil, which is very largely superior to that of many other states; for instance, let the Campbell system of farming be adopted, and the too common slipshod methods of soil culture be dropped out of sight.

Now, whether we will accept and adopt the best and wisest method of developing the resources of the state, or not, at once, it will be done in the near future. And when once in full force, Kansas will produce more breadstuff, more beef, more pork, more poultry, more butter, more cheese, more alfalfa, more honey and fruit than any other two states of this great republic.

PRESIDENT TAYLOR: We count ourselves to be particularly fortunate today in having with us the secretary of the State Board of Agriculture of Oklahoma, Hon. C. A. McNabb, who will now address you on the subject of "Grape Culture."

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GRAPE CULTURE.

By Hon. C. A. McNabb, Oklahoma City, Okla.

Mr. Chairman, Fellow Farmers and Kansas Horticulturists, Ladies and Gentlemen: It gives me great pleasure to be with you on this occasion. It is a pleasure I have had in anticipation for some years past. It was my good fortune twenty-two years ago to be a resident of your fair state, and for four years thereafter. Since that time I have done my little share, I presume, toward the development of your sister state, Oklahoma, until we have reached the point where we can come into your midst and say to you, "We are not ashamed." The subject that has been assigned to me on this occasion is "Grape Culture." If I should forget myself during the course of my remarks and too frequently refer to my own actions, I trust you will not consider it egotistical at all, for the fact is all my personal knowledge, little as it is, of grape culture, has been obtained through work in the vineyard, not from what I have heard somebody say, or what I have seen some other fellow do.

For some years I had twenty-two acres devoted to grape culture in Oklahoma. I have at the present time seven acres. Unfortunately, Oklohama City has grown so fast that it has encroached upon my domain, and necessitated the reducing of the acreage of my vineyard.

There are so many little details in connection with caring for the grapevine that are so apt to be disregarded or overlooked by the average fruit grower! From my observation, I am led to believe that the man who makes a failure growing grapes makes it because he does not see the importance of little details. I know of a few instances where people have observed the wonderful success of some one fruit grower in a locality, and they would form the conclusion that it was possible for anybody to acquire a like success, and would immediately proceed, in their way, never for a moment taking cognizance of the little details in the work, which can be obtained only through years of experience. Consequence, failure in most instances.

I am going to be brief, and will begin with this statement with relation to grape culture: Grow your own vines. Now, I know the nurseryman is present, and he will not be pleased, but I must say that it is much easier for you to grow your own vines, and also much more satisfactory, than it is to purchase them from some unknown grower, and have them exposed from time to time with shipping, digging, delivering, hauling, and finally throwing them down in the dooryard—with a promise to heel in later on, only to be forgotten for a day or perhaps a week. Grow your own vines; it is easily done. The average grape cutting is from seven to nine inches long. It is made of wood grown the same season in which the cutting is made. It consists usually of three buds; cut off directly at the lower bud, leaving two others with a tip of a half inch, that you may more easily discern which is the top and which is the bottom end of it, and for the further purpose of enabling you to handle it without danger of breaking off the buds after they have swelled in the spring. Make enough of those cuttings, of the varieties you wish to grow, to enable you to select only the very choicest of those vines for your own planting, and throw the others away or give them to some less fortunate neighbor.

The kind of ground that you should grow grapes on is a soil that is well drained and has plenty of sand mixed with it. In no case would I advise the

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planting of grapes on a soil that has a tendency to hard-pan, nor ground that lies absolutely flat and has no surface drainage. That means a short-lived vineyard, shy of grapes in most instances. The ordinary run of varieties you plant eight by eight feet. This is the customary distance. There are varieties of shyer-growing nature that may be profitably grown planted six by eight feet. I am often asked the question: "How do you get Delawares to fruit for you?" The answer is, always thin and prune them until you have almost no vines left. The Delaware, if you have noticed, has joints from one and one-half to two and one-half inches long. Now, if you leave the amount of vine generally left on stronger growing varieties there are too many buds on them to produce good fruit, consequently you will produce a large quantity of inferior fruit and also a dead vine.

I shall not on this occasion go into anything like a talk on varieties. You claim your conditions here are different from those where I have had my experience in grape culture. To a large extent, perhaps, the same condition would apply here that applies there. However, the grape is a peculiar fruit. It seems to thrive in one situation in a certain locality, and perhaps in that same locality in a little different situation it will not be a success. These are things you must work out for yourselves.

In preparing your plants for setting, they should be pruned, root and top. Cut the top back to about two buds. If the nurseryman has done his duty each vine has a strong root system. You should prune those back by simply clasping the vines and holding the roots in the hand and with one or two motions of the pruning shears cut off to about six inches. Cut away the surplus top, because if not cut it will produce a straggling, irregular growth that will not be entirely satisfactory. In preparing the holes for setting the vines, you should use a little more judgment and not quite so much effort. I have known men to consume a whole day in planting fifty grape-vines. They would dig a big hole, throw in a lot of surface soil, and then carefully plant the vine. At the second they would consider it would not be necessary to have quite such a big hole, and so on. Now, why not use horse sense to set your grape-vines? Prepare your ground as you would for grain; harrow it down to a nice condition. Set your row of stakes. With a good, steady team, a man with a good eye can throw a straight furrow to the right and left from those stakes with a fourteen-inch plow, and then follow that with the lister, and you have a trench in the neighborhood of eighteen inches deep from the surface level. If you have good grape soil, that is a good depth for setting grape-vines—fifteen to eighteen inches. The majority of our grape-vines are set too near the surface, and while we are sure we are never going to have winds again, nevertheless they will blow just as long as time lasts, and if you have sandy soil, as you should have for grapes, it has a tendency to move about sometimes. They should be set deep for another purpose—that you may better cultivate them without danger of damaging the roots; and for a still further purpose, that you may get them down into the soil where there is always moisture to mature the fruit regardless of surface conditions.

Before setting the plants in this furrow, I take about a No. 9 black wire and stretch it up on a lot of fence posts. The wire is as long as my row of grape-vines is going to be, and with an eight-foot pole I measure off the wire, and at each eight feet file a little notch to keep the strings from slipping, and then wrap three or four laps of cotton string around so as to make

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a little tassel which will always be in evidence. The wire is stretched tightly in the furrow and should not come in contact with either side. At each eight-foot mark I set a little stake, then raise and move the wire to the next furrow. I now pull out the first peg, throw it into the next furrow with the wire, plant a vine in its place, and repeat until the whole row is planted. This process is repeated with the next row, and the next, until the planting is finished. Thus every vine is set in its proper place, preferably on about a half shovelful of good rich earth, a sort of a mound. These roots will spread out and feed down. Now put about two spadefuls of earth on them and tramp it down, and go on. After a row or two has been planted hitch to your cultivator and fill the open furrows. That is a whole lot better than digging the holes by hand. There is nothing, to my notion, that looks nicer than a vineyard that checks up well in every direction. The first year after you have done this planting it is only necessary that you should cultivate often and thoroughly, allowing the vines to grow just as they will. You need not have a trellis at that time. By not having a trellis you can cultivate both ways. However, the hoe should not be forgotten. The ground should be worked close up to the vine, keeping out all grass and weeds.

The following winter, or first dormant season after the vines have been planted they should be cut back to three or four buds. At least a temporary trellis must now be constructed. By temporary trellis I mean that you may set a post to each six vines. A post should be set to each three vines finally, excepting the end post and the one next to it, which should be only sixteen feet, or two vines apart. A pretty good plan is always to have the wire on the temporary trellis pretty well down, we will say fifteen to eighteen inches above the level of the earth. The object in having it low for this second-year growth, or first-year trellis, is that you may be able to tie the young shoot to the wire, and thus make sure that you are going to have one strong cane that season, with no danger of it being knocked off. When one shoot has become perfectly attached to the trellis-wire all others should be broken out, or you may allow two of them to grow if you prefer. My preference is for one. Now remember, you simply allow these vines to grow as they will, but do not forget that frequent and clean cultivation should be practiced throughout the season. When the second dormant season arrives we prune up to one cane for bearing purposes for the next year, or the first year's crop, which should be a light one. In the meantime, raise the trellis-wire and put it up not less than thirty inches from the ground, and tie the cane to it in such a way as to insure a straight trunk. Tie canes to lower wire with willows or heavy twine. We use rye straw for tying the young shoots to the middle and top wires of the trellis. This straw does not chafe the vines, and lasts until the tendrils take hold of the wire. The straw should be cut into lengths of from five to six inches.

The average farmer falls down in attempting to grow a few grape-vines. He does not seem to exercise, in the first place, practical judgment as to what the vine is able to stand, nor how to prune it so as to make it an easy job for all time to come. The man who is successful in handling a vineyard learns the grape-vine as he learns the members of his family. I had in my care something like 15,000 grape-vines, and I knew each one of those vines by name, as it were, and when I came to the pruning I could tell at a glance just what they needed; what to leave and what to cut; how many buds to

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leave; whether the vine had been perhaps overloaded a little bit; whether, considering the conditions the year before, it had had an easy job.

As to the question of spraying: There is no man in this country who can make a success of growing grapes without spraying, any more than a farmer can grow corn without the cultivator. Do not undertake it until you decide firmly and surely that you will provide yourself not only with a sprayer, but with a good sprayer, and when the time arrives for using it that you will use it, and with proper discretion. It must be used in order to make it effective. You should spray your vineyard not less than six times, and from that to ten times, in a single season. I will not tell you what kind of a spray I use. That you can find from your Experiment Station.

As to marketing your fruit: Let me say on that line, if conditions are in Kansas what they were eighteen years ago, I am safe in saying that 90 per cent. of the grapes that are picked in Kansas are marketed before they are ripe, and this is the case in Oklahoma, and I think this is the case in nearly all our Central and Southern states also. Concords are often picked before they are ripe. A great many people get the notion in their heads that twenty-four hours after grapes turn black, or start to turn black, that they are ripe, and unless picked at once will fall off the next day. They pick them off without any further thought or consideration, and put them in any kind of an old box they may have, and drive into town and say, "How much will you give me for my grapes?" The grocer offers a half cent a pound. What can he do? He cannot take them to a good fruit-stand, as they are fit for jelly only. He has to take simply what the grocer offers, because grapes do not ripen one iota after they have been taken off. The sensible thing to do is to allow the fruit to thoroughly mature before it is gathered. I have one man who has done my picking for eight years. One man does all my picking, and he never bruises a grape. Our packers go over the clusters, cluster by cluster, picking up by the stems, and if there is a green or damaged berry on that cluster it is picked off. The fruit is carefully packed in regular courses, the top of one cluster covering the stem of another. For shipment we use the eight-pound basket altogether.

Now, then, does it pay to put fruit up in the right kind of shape? For the past six years I have depended to some extent on a foreign market for my grapes. Now that entire market was just within the confines of Indian Territory and Oklahoma. I never shipped grapes but once into Kansas and once into Texas, for an experiment. I find my best market right at home. My plan is, say ten days before we begin picking grapes, I write to my customers, stating that on such and such a date we will begin picking grapes. The price will be so much f. o. b. Oklahoma City. Before we pick a grape we have sold the entire crop in the vineyard.

Now, just a moment on varieties: As stated to you in the beginning, the question of varieties is a thing you must settle to a large extent yourself. The Delaware is our best, decidedly so; will make more money per crate with less work than any grape we grow. The Concord is our poorest, notwithstanding it is the greatest in favor. I presume there are more Concords bearing in Oklahoma than all other varieties combined. I presume the same conditions apply to Kansas, yet, I doubt not, you will disagree with me if I say that the Concord is a most unsatisfactory grape. It is one of the hardest to grow, one of the most expensive to grow there is in the whole list, and

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yet you will insist upon growing it. Did you ever study the Concord grape in its nativity? The Concord belongs to that variety known as *Vitis Labrusca;* its natural home is north of the Carolinas and east of the Allegheny mountains. We have many grapes indigenous to the Southwest—their natural home. One that has so far shown the greatest promise, and has produced, by way of hybrids, something that is of a perfectly satisfactory nature in the Southwest, is the *Vitis lincecumii*, or Post-oak grape, which grows in Oklahoma, Texas, portions of Arkansas, part of Missouri, and I don't know but a little bit in southeastern Kansas. The deep, penetrating root enables the vine to go through almost any spell of dry weather without the slightest injury. I had them growing in my vineyard right next to the *Labruscas*—Concord and Niagara. If you could go up on some points a mile away where you could look down on that vineyard you could tell which rows were *lincecumii*, from their bright-green foliage. Many hybrids of this species have been introduced by T. V. Munson, of Denison, Tex. To what extent they have been tried in Kansas I do not know.

It is generally understood by the growers in Oklahoma that the Delaware does not do well in Kansas. I don't know why it is unless you leave too much wood—too many buds. For your second year's crop you should have not over thirty-five to fifty buds. You will get just as many pounds of fruit with fewer buds as you will with too many buds, and each cluster will be perfect in itself.

Briefly stated, the pruning methods covering the first three or four years are as follows: Before planting, the young vines should be pruned back to two or three buds, and the roots should be cut back to about six inches in length. After one year the vines should again be cut back to three or four buds of the previous year's growth. When one or two shoots are long enough to tie to temporary trellis, break out all others. After another year's growth, trim to a single straight cane, leaving it long enough to reach the lower permanent trellis-wire and turn over about one foot. Rub off all buds except ten or twelve at the top, as they start in the spring. This will form the permanent trunk and head of vine. The effort now is to retain that stalk or trunk and head of vine, which can be done by leaving two or three short spurs of two or three buds each at the head of the vine in all subsequent prunings. Each of these spurs will furnish a bearing cone or arm and a spur for the growing of next year's arm and spur. All arms and spurs are renewed annually.

MR. FERGUS: I don't know whether the rest of the horticulturists are interested in grapes or not, but I am. I would like to know the varieties of Mr. Munson's grapes the gentleman has tested, the varieties he was pleased with, and the failures.

MR. MCNABB: I do not know that I can recall just now all the Munson varieties that I have tried. The Doctor Collier, one of the Munson hybrids, did exceptionally well. This is a grape that I consider will take the place of the Concord very well. It has wonderful keeping and excellent shipping qualities. The only thing against it is its color, which is a dark copper shade, and it is covered with a silvery bloom when ripe. The American people have become accustomed to a black grape.

A MEMBER: How is Moore's Early?

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MR. MCNABB: Moore's Early is not a good shipper. The quality is good. Not a very great improvement over the Concord. It ripens evenly.

A MEMBER: When do you prune the vines?

MR. MCNABB: Any time in the dormant period, from the first of December to the first of March.

J. W. ROBISON: You speak of the Post-oak grape. Is that the bunch grape that grows over the greater portion of Texas?

MR. MCNABB: No; you have reference I think to the Mustang. The Post-oak has a very heavy-growing or medium-growing vine, and will grow upon the top of the highest dry hill. Produces beautiful clusters of grapes, in some instances equal in size to the Concord, and a very fair flavor, and an extremely rich grape. Of course, you understand any species of grape varies a whole lot in the individual vine with reference to size of berry, cluster, and fruiting qualities, or in the character of the fruit, just as we have in the various varieties of the *Labruscas* or fox-grape. The *Vitis lincecumii*, or Post-oak, varies in size from the little fox-grape we used to get in the East to that of the Concord.

A MEMBER: Is it listed in the catalogues?

MR. MCNABB: No, you will not find the native species listed under their species name.

A MEMBER: Is the Herman Jaeger a Post-oak?

MR. MCNABB: The Herman Jaeger is a Post-oak crossed with Herbemont (*Æstivalis*). You can get all those Munson hybrids direct from Mr. Munson. The Brilliant is one of Mr. Munson's very best. The only objection we have to it is that it does not seem to produce quite as much foliage as it should to protect the fruit. The Long John is one I don't like. The R. W. is pretty fair.

A MEMBER: What of the Carmen?

MR. MCNABB: The Carmen is very good. The Herman Jaeger is very good; it has an extremely compact bunch.

J. W. ROBISON: Is it not a fact that Mr. Munson considers it more valuable to produce those hybrids than to fruit the species itself?

MR. MCNABB: Oh, yes, certainly. The hybrids are selected because of superior flavor, cluster, etc. The *Labrusca* roots spread out horizontally and do not penetrate deeply into the soil, while *lincecumii* roots head right down.

A MEMBER: Did you criticise the Concord as being hard to grow?

MR. MCNABB: Yes, sir, particularly when it comes to fighting the rot.

A MEMBER: Well, do you mean that to apply to your location, or our conditions in Kansas?

MR. MCNABB: It applies to both, and in a general way to the entire Southwest. I realize that there are many people who are wedded to the Concord grape, and if you ask them the reason why they can not tell you. The Concord grape has taken a place with the human family, especially with Americans, that is going to take a very hard struggle to supplant, but I think it is largely notion and because it is a black grape.

A MEMBER: I can tell you its results with me—we cannot raise any other kind.

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MR. MCNABB: Perhaps you are like many others—have not tried other varieties. The Dr. Collier is an extremely rank-growing vine, perfectly hardy, and I am going to be what you might call extravagant in my statement. You can raise many times as much fruit on the Dr. Collier as you can on the Concord on any vine west of the Mississippi.

A MEMBER: Would the Dr. Collier be hardy up here with us?

MR. MCNABB: I think it is as hardy as Concord.

A MEMBER: Does the Delaware succeed well with you? Why can't we raise it here?

MR. MCNABB: Yes; and I believe you could grow it here if you went at it right. The Delaware is a delicate grape. Some in northern Texas tell us they could not do anything with the Delawares. Why should n't it do well both in northern Texas and southern Kansas. I cannot see any reason. There is a tendency to leave too much bearing wood, so that they overbear and lose their vitality.

A MEMBER: There is one question I would like to ask you in regard to planting cuttings. First thing after you cut your cuttings do you try to get any root growth on them?

MR. MCNABB: I have made great quantities of grape cuttings; in fact, for some years I grew large quantities of grape cuttings for the nursery trade; that is, in a wholesale way. We always put them in what we call a cutting-box, butts all one way. Each day those are bunched and burried butts up. Open a trench, say about three feet wide, or three and a half, just the spade depth, in sandy soil, with a south exposure, and set the bunches in with butts up, one against the other. Scatter fine, loose soil over it to work down between so there will be no air-spaces of consequence. Dig trenches on either side so as to make sure no water will run in. We leave them in there until about the 10th of April, when they will be nicely calloused.

A MEMBER: Do you find the Delaware easy to start from cuttings?

MR. MCNABB: Reasonably so. It is not generally considered as easy to start them as the Concord or other *Labrusca* varieties.

A MEMBER: Do you run your trellis always north and south?

MR. MCNABB: Not always, but I like it best that way when conditions are right. I have one vineyard trellis running east and west. You should trellis at right angles to the slope of the ground. If you trellis with the slope you will cultivate your vineyard rows so the soil will wash away. If you trellis at right angles to the slope it will always hold the soil better.

A MEMBER: What do you think of the Brighton grape?

MR. MCNABB: It is a splendid grape, but difficult to grow. The Brighton, you understand, is one of the very few that has recurved stamens, and consequently not easily self-fertilized. It is considered advantageous to plant other varieties with it that flower at the same time, in alternate rows.

A MEMBER: I would like to ask you if those Japanese plums do well with you?

MR. MCNABB: Yes sir; they do very well.

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A MEMBER: Don't you think it is because it is a warm climate down there?

MR. MCNABB: Yes. We experienced considerable trouble with rot this season, however.

FUNGI.

By LUMINA C. R. SMYTH, Ph. D., Topeka.

The title of my paper as it appears in your program is appallingly vast in its scope, and to do justice to it would require far more time than has been allotted to me. The endeavor to save space in the printing of the program shortened the title but lengthened the subject, and renders it difficult to condense it to a brief paper.

It was my intention to give a short outline of fungi in general, dwelling particularly upon those forms that are of most interest to the horticulturist, placing more stress upon the life-histories and parasitic habits of some of the common and pernicious forms than upon the prevention and remedies, though I do not intend to omit that phase of the subject entirely. It is an acknowledged fact that vast injury is done annually to plants of great economic importance by the attacks of these lower plant organisms. It has been demonstrated that there are, in most cases at least, efficient methods of keeping these diseases in check. But it is certainly true that to fight them most successfully we must know something about our enemies, so that we may recognize them, the vulnerable points they are likely to seek to gain a foothold, and the character of the injuries they inflict.

The human physician studies anatomy, bacteriology, and materia medica before he attemps to treat his patients; so the plant pathologist studies botany, mycology and fungicides before he ventures to prescribe for ailing plants. It is true that there are various methods of learning to doctor sick plants that would not be tolerated in the medical profession, since the life of a plant is not held very sacred and neglect and mistakes are not rated as criminal when plants are under treatment; but even so, it is far more profitable and effective to know what the causes of the difficulties are, what are the best remedies to use in each case, and when is the best time to apply the remedy. The plant pathologist needs the coöperation of the intelligent horticulturist to do his most effective work, just as the human physician finds the intelligent parent or trained nurse is his most helpful, nay, indispensable, assistant in caring for his patient. So we see that present methods require the horticulturist to know something about fungi and their method of injuring plants; and public sentiment among us is coming to hold that it is no more right for a person to harbor in ignorance a diseased and disease-spreading tree than it is to harbor a person having the smallpox without making an effort to protect the public from infection.

The fungi constitute one of the great groups of the lower plants. Their relationship comes nearest to what we know commonly as the "pond scum," or algæ. They are separated from the algæ on account of their lack of green coloring matter. Scientific study has discovered that plants having this green coloring matter, chlorophyl, when exposed to sunlight and growing in soil or solution having a slight per centage of iron have the power to take carbon dioxid from the air, water and some of the nitrogenous compounds from the soil, and combine them into the complex food substances,

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starches, sugars, fats, oils, and albumins. This process of food construction is called "photosynthesis" and is possessed only by organisms having chlorophyl or its equivalent. Since fungi have no green color they cannot manufacture their own food and must get it from some source already prepared. If they obtain it from living organisms they are called parasitic; while those that subsist on decaying organic matter are called saprophytic. It seems probable that the fungi had the power to manufacture their food at some time, but the habit of feeding on other organic matter produced degeneration, which renders an organism or an individual absolutely dependent in time.

Owing to their feeding habits, then, we do not find in the fungi those organs intended for the preparation of food, but instead we find organs for drawing the cell-sap from the host-plant. The entire fungus may even live within the body of its host, pushing its fine thread-like mycelium among and into the cells of the plant upon which it feeds. Those which live more on the exterior send beneath the surface specialized threads called "haustoria" to absorb nourishment for the rest of the fungus. Not many of the fungi have specialized organs for storing food, but depend upon the continued life of their host or upon their own great productive facilities. For it is an interesting fact that, in spite of the injury which the host suffers, the presence of the parasite often stimulates excessive growth. There are some forms that do possess storage organs, and these are interesting and peculiar.

But the part of the fungus that is most highly specialized and most conspicuous is that devoted to the maintenance of the race, the reproductive portion. However concealed the growth may have been, underground or within the body of the host, the fruiting portion is more or less exposed, in order that the spores may be widely disseminated. Fungi reproduce by means of spores, not seeds. There is a technical distinction: spores and seeds are not analogous and the terms are not synonymous. A spore is a single reproductive cell, formed externally in a cavity or sac, which is able to germinate directly to form a new individual. A seed is an embryo plant enclosed within an ovule and surrounded by integuments. The seed is an exceedingly complex structure and involves the further development of an internally formed spore.

The spores of fungi differ from each other in a great variety of ways. The methods by which they are produced are not all alike. The organs on which they are borne vary greatly in complexity. But the spores and their methods of production and the peculiarities of the fruiting bodies are so characteristic that the classification of fungi is almost entirely based upon these characters. It is not an easy matter to classify the fungi. The reasons are too numerous to give here, but one is our imperfect knowledge of the complete life-histories. It not infrequently has happened that one stage of the fungus was all that was known when the plant was first described and named. That stage would be placed with one group, and a later stage would not be recognized as belonging to the same fungus. The best examples of this might be found in the case of "cedar-apples" and rust on apple leaves; or the rust on barberry and wheat rust. And it was a long time before the mummied peaches that hung on the trees through the winter were known to be the storage bodies that gave rise to the spores of brown rot. When the life-history seemed incomplete or the facts were unknown such fungous plants were grouped "*Fungi imperfecti*" and pigeon-holed.

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Now they are being sorted out of chaos, linked together, and properly placed with those that are similar. And it is a constant source of interest to learn the different stages of the same plant and the various hosts upon which a single species may live.

The simplest method of spore formation is by the constriction of specialized threads called "hyphæ." Spores may arise by this method either singly or in chains. More elaborate forms have their spores enclosed in special sacs, and still others have them borne on stalks in the folds of special fruiting bodies. In some forms the spores are motile; these are necessarily aquatic or moisture-loving fungi; others are dependent upon other agencies for distribution. Sometimes the spores are formed after the union of two elements, and we speak of this union as conjugation; the uniting elements are called gametes. This process of spore production is not always known, but is by no means unusual; in fact, some suspect that it always occurs before certain spores can be formed. Those spores resulting after conjugation are called sexual spores; those which are not preceded by union of gametes are non-sexual.

When a spore is shed and the conditions are right it germinates. Some require a period of rest first, others wait for more moisture, and still others require higher temperature. Many will germinate at almost freezing temperature; others find about 25 degrees Centigrade (77 degrees Fahrenheit) is most favorable, and some require the temperature of the alimentary canal of some bird or animal. Heat above boiling destroys their vitality. Oxygen is always necessary. If the spore is unfortunate enough to sprout too far from a possible host the growth soon dies. If it is properly situated the young hyphæ enter through a pore of the leaf or a break in the plant tissue and the growth continues within the host's body. Or the hyphæ send little rhizoid-like threads called haustoria into the tissue of the host to draw the nourishment while the remainder of the growth proceeds externally.

The lowest fungi (*Phycomycetes*) are mainly aquatic in habit. The white rust of the mustard family, however, require merely moist conditions at certain periods. The threads of the mycelium, or vegetative portion of the algal fungi, have no partition walls during the time of spore production. The fungi of this group most menacing to gardeners are: The damping-off fungus so destructive to young seedlings; potato blight; dry-rot of stored vegetables, especially all of the potato family; the downy mildews (almost every family of plants has some downy mildew); the white rust of the mustard family; the black molds, which are the bane of the housewife when they attack bread, cake, and pastry.

The black molds are mainly saprophytic, but are interesting, because in them we find incipient parasitism. Having a well-cultivated taste for canned fruits, they are now developing an appetite for fresh fruit, and have been found attacking ripe fruit through minute wounds, and even through thin skins. Some of the black molds are of economic importance because of their ability to convert starch into sugar; and then another fungus, yeast, is used to change the sugar into alcohol. If alcohol had no other use aside from that of a beverage I should scarcely dare mention this fact in Kansas.

The sac-fungi (*Ascomycetes*) produce their spores in sacs. These vary in shape and size, but the number of spores enclosed is always definite. The formation of these sacs is always preceded by conjugation. Many of the so-called *Fungi imperfecti* have been found to belong to this group,

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and among the well-known sac-fungi we include leaf-curl, plum-pockets, green and blue molds, and their allies, powdery mildews, ergots, strangling fungi, black-knot, cup fungi, the edible morels and their allies, and truffles.

The third group of fungi are the stalk-bearing fungi (*Basidiomycetes*). To this group belong the rusts, trembling fungi, club, coral, and pore fungi, "mushrooms and toadstools" or gill fungi, puff-balls, earth-stars or geasters, bird's-nest fungi, and carrion fungi.

In this group the spores are borne externally at the end of special stalks produced by the hyphæ. In the highest of these the hyphæ are compacted together to form an elaborate fruiting body. The rusts have the basidia or stalked spore cells arising directly from the winter spores.

Now I do not desire to give the impression that all fungi are to be considered harmful. Some, like yeast, are almost indispensable; and many are of great importance. Their work of hastening disintegration of waste and decaying material is of great benefit. Some are of value as food and are classed among the delicacies of the table, and gathering and preparation for market of these forms has become a recognized industry. Many times, too, innocent fungi, busied at their work of using up dead tissue, are accused of doing the damage that has already been done by some other organism.

The soft rots belong to the algal fungi and attack almost any kind of ripe fruit. They are especially injurious under damp conditions. Although they are aided in entering the fruit by injuries to the skin, they can enter thin-skinned fruits easily.

The brown rot is a very different matter. This belongs to the sac fungi. This rot (*Sclerotinia fructigena* [P.] Schrt.) is especially destructive to peaches in states where they are grown. It will attack almost any stone fruit, and even apples, though rarely. It begins to show its work as soon as the fruit ripens; and while it may confine its attack to ripe fruit alone it also is known to injure rather green fruit, and to extend even to the young twigs, leaves and opening flowers. Its appearance is marked by brown spots that rapidly spread in size and become very soft, and are finally covered with a soft brown powder. These powdery spots are masses of summer spores ready to be scattered to other fruits, germinate at once, attack the tissue, and swing around a brief cycle of existence. Injury to the skin of fruits by insects and other agencies hastens the damage, which is terribly swift anyway.

While connected with the Ohio State Agricultural Experiment Station, at Wooster, Ohio, I assisted in some tests to determine how long it took to infect with summer spores or brown rot. When spores were placed on fruit free from blemishes, by means of a camel's-hair brush, the fruit was badly spotted at the end of forty-eight hours. Fruit that was infected by pricking with a needle that had been brushed over decayed fruit was entirely worthless at the end of two days. Peaches that were infected with spores of brown rot were in decidedly bad shape two days after shipment.

The summer of 1906 my husband sent several baskets of choice Elbertas to Denver, Colo., which had been carefully hand picked and were still firm and free from rot, but had been infected with brown rot by wind-blown spores, and when they reached their destination, over half of them were badly rotted, especially those in the bottom of the basket, where ventilation was not good. Now, for a long time only the summer spores were known. Finally it was noticed that many of the fruits that were badly rotted did not

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drop off, but clung to the trees all winter. These were named "mummies," and eventually it was discovered that these mummies were storage stages of the brown rot. When warm spring days come these develop a layer of sacs on the surface, and in these sacs are borne spores that germinate, attack the fruit, and give rise to our well-known summer spores. The removal of all these mummies from the trees and their destruction, together with portions of affected branches, as well as the debris beneath the tree, is necessary to reduce the injury in the following year. I know of a small orchard so badly infected with fruit rot that the odor from one of the infected trees was positively sickening. Later in the year (1906) I was talking with the owner of the place and told him of the connection of the mummied fruit with the rot and advised him to remove all from the tree. His face expressed incredulity, but for politeness he removed those he could reach from the ground easily. Others were left and some still cling in their effort to carry infection over through a year without any fruit.

Black-knot (*Plowrightia morbosa* [Schw.] Sacc.), which has been so destructive to plum and cherry, is one of the sac-fungi. The knotted portions of the stem and leaf are storage bodies. Many states have found it necessary to compel the complete destruction of infested trees, and severe pruning of the diseased portions is an absolute necessity as the hyphæ penetrate the tissue far beyond the portions where the knots are evident. The entire hyphal body, called mycelium, lives within the bark, ruptures it, and causes the underlying wood to become swollen and soft. It feeds on this tissue, and eventually forms a dense mass of mycelium on the outside of the branch. This is yellowish-brown at first, and gives rise to numerous summer spores. In the fall this mass becomes blackened, and within it are formed pear-shaped capsules which are lined with a layer of elongated sacs, each containing eight spores. These capsules open by a terminal pore from which the spores escape after the sacs burst in the spring. Pruning of the knotted portions and persistent spraying with Bordeaux at the time of germination of the spores are usually effective.

Plum-pockets and leaf-curl are both caused by sac-fungi. Pockets are also formed on cherries. Fruit suffering from this latter disease becomes abnormally enlarged, turns yellow, then gray, from the coating of spore sacs that cover the outer portion. The entire fruit becomes soft; there is no pit formed. The spore sacs are elongated and each contains eight spores. These spores may germinate and affect a new host directly. The mycelium lives within the host year after year, when once it gains admission, and it is not safe to use grafts or buds from trees which are once infected. If done in time severe pruning of the portions known to be diseased may save the tree and the rest of the orchard from the infection.

The powdery mildews are sac-fungi that do not live within the body of the host, but can be seen on the surface of the leaves as a white, moldy covering. The summer spores are produced in enormous numbers. They are pinched off in rows from the end of the hyphæ, and their abundance makes a dust-like covering to the leaf that gives name to the group. In the fall minute spheres are formed, which become yellow and finally dark-brown or black. These are sac-capsules, and contain one or more sacs of two, four or eight spores each. These capsules have no regular aperture or method of opening, but they often possess elaborately shaped appendages that may be branched or coiled at the tip and which form a sort of crown.

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All the powdery mildews, when seen through the microscope, are marvelous in beauty, because of the reticulations of the capsule or perithecium and the gracefulness of the thread-like appendages.

These powdery mildews, although they live externally, are often serious parasites, because of the injury they do to the leaves. They are found on a great variety of hosts, such as—

Just a few grasses, *E. graminis* DC.
Cucumber, *Erysiphe cichoracearum* DC.
Cultivated pea, vetch and crowfoot, *Erysiphe communis* (Wallr.) Fr.
Vines, *Uncinula necator* (Schw.) Burr.
Willow, *Uncinula salicis* (DC.) Wint.
Elm, *Uncinula macrospora* Pick.
Cherry and plum, *Podosphæra tridactyla* (Wallr.) Wint.
Apple, etc., *Podosphæra leucotricha* (E. & E.) Salmon.
Lilac, *Microsphæra alni* (Wallr.) Wint.
Strawberry, hops, *Sphærotheca castagnei* Lev.
Gooseberry, *Sphærotheca mors-uvæ* (Schw.) B. & C.
Roses, *Sphærotheca pannosa* (Wallr.) Lev.

Some special inquiry has been made concerning the mildew so prevalent on roses. This is one of the downy mildews, *Sphærotheca pannosa*. It is a serious disease on the Crimson Rambler and renders the plant very unsightly. The leaves are covered with a fine white coat, and finally become distorted and stunted. The summer spores are in chains at the end of erect hyphal threads and spread rapidly to the young shoots. Toward late summer or early fall there appear dark, sooty particles. These are sac-capsules. Each capsule contains one eight-spored sac. The capsule does not open until spring. The spores then germinate by sending out a slender tube from which the new mycelium and sucking haustoria develop. The summer spores are most to be dreaded as they spread the infection much the fastest. Flowers of sulfur dusted on the leaves will kill the mycelium and the summer spores. Florists paint their steam-pipes with a mixture of oil and sulfur. Potassium sulfid, or an ammoniacal solution of copper carbonate is also used as a spray. Outdoor spraying can be done with Bordeaux, but the sediment on the leaves is not much prettier than the mildew.

By far the most serious disease of the apple is known as apple-scab, *Venturi pomi* (Fr.) Wint. This is another of the sac-fungi, and has more than one kind of spores. The fungus first makes its appearance on the leaves in early summer. It produces circular spots of a light-gray color which spread and combine. They turn olive-green and, later, black. These portions of the leaf are covered with a layer of upright threads which give rise to the summer spores. These hasten the spread of the disease to unaffected portions and to other trees. Badly affected leaves are often distorted and shed, and so many other leaves are prevented from functioning normally that the vitality of the tree is seriously impaired. Cold, damp summers seem especially conducive to the spread of the disease. The spots are not confined to the leaves alone, but extend to both stem and fruit. The fruit spots are dark-brown to black, with a whitish rim, and are quite scabby in appearance. They are not over half an inch in diameter, and are more abundant toward the blossom end. The value of the fruit is always lessened for the market if any of these are present, and in many instances the fruits are deformed, dwarfed, and even drop from the trees while still young.

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Affected portions gap open and allow spores of soft rot to gain foothold. The winter spores are two-celled, eight two-celled spores being formed in each sac. The sacs are enclosed in a capsule borne in the tissue of the leaf.

Various recommendations have been made to subdue the disease. Spraying with Bordeaux has been found effective when combined with proper care as to the cleanliness of the orchard. A winter spraying of copper sulfate, followed by Bordeaux just before and just after blossoming, with three or four later sprayings at intervals of two or three weeks, depending on the rainfall and coolness of the season, have been found of great benefit. Orchards where the trees are well spaced, properly pruned, and the ground beneath kept cultivated, or at least free from accumulated debris of diseased leaves, are not likely to be seriously attacked unless one is unfortunately close to a slovenly neighbor. Those of you who are careful in the care of your own orchards may also appreciate laws compelling your neighbor to keep his premises free from infectious things.

Among diseases that may do considerable injury to apple orchards are the rusts, *Gymnosporangium* species. These form large, somewhat swollen yellow spots with beak-like projections on the under surface of the leaf. If extensive in their development they cause great loss of foliage and considerable injury to the tree. These spots, with their beak-like projections and yellow summer spores, are the cluster-cup stage of a rust that passes part of its life on the Red cedar. Nearly every one is familiar with the "cedar-apple," as it is commonly called, and many know that it is related to apple-leaf rust well enough to refrain from planting Red cedar as a protection to a young orchard from wind. In dry weather these cedar-apples are not noticeable; but during the warm spring rains they produce gelatinous stalks of a vivid orange on the surface of the dark-brown excrescences, and these are where the winter spores are to be found. This is an excellent example of a fungus that divides its life between two widely different hosts. There are several species of *Gymnosporangium* that affect apple and cedar and other trees of the juniper type.

Wheat rusts, *Puccinia graminis* and *P. coronata*, are examples of rust that live on two hosts, the former passing its cluster-cup and pycnidia stages on barberry and the latter on buckthorn, while the uredo- and teleuto-spores are on wheat. There are also other wheat rusts that pass their cluster-cup stage on native grasses. It is also rather definitely shown that it is possible for a rust to omit one of these stages of spores and to continue for a long period without producing the winter spores, bringing forth generation after generation of summer spores under open-weather conditions.

The rusts seem to have the greatest variety of hosts for the single species of parasite and the largest number of different spores. As many as five distinct spores are produced in the life-history of some of the rusts; and if some require two hosts and pass different stages on each, others may live on a great many different plants equally well during all stages.

The majority of the stalked fungi (*Basidiomycetes*) are earth-loving or wood-inhabiting saprophytes. Aside from the rusts and smuts, which are the most destructive disease-producing members of the entire group, the timber and timber-tree diseases rank as almost the only other undesirables. As food producers the stalked fungi rank high, since they include all of the edible mushrooms, pore, club, and tooth fungi, as well as the puff-balls. Many of the shelf fungi are wrongfully accused of injuring trees. In the

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great majority of cases the carelessness of man in hitching horses where they can injure the bark of a tree, or neglecting to apply preventives to unavoidable wounds, has been the opening wedge for a fungus that could not have made an attack unaided.

You see, doubtless, the length to which my paper might extend if I attempted to mention even all of the more common injurious forms. It is a subject which never loses interest, for the more one learns the more he desires to learn about them. There are other disease-producing species which are more important to the forester, to the farmer and to the florist than to the horticulturist, but I have endeavored to confine myself to those most injurious to fruit and fruit trees.

LETTER FROM MR. KELSEY.

HUTCHINSON, KAN., December 12, 1907.

Mr. Walter Wellhouse, Secretary State Hort. Soc., Topeka:

DEAR SIR—I enclose herewith three original photographic views of the exhibition made by the Kansas State Horticultural Society at the joint meeting and horticultural exhibition of the American Pomological Society and the Pennsylvania Horticultural Society in Philadelphia, September —, 1869. This exhibit received the award of the "Great Gold Medal" of the Pennsylvania Horticultural Society in competition with the older settled and well developed sections of the country from Massachusetts to California. These, so far as known, are the only copies in existence, and I wish to present them to the Kansas State Horticultural Society, to be preserved as a memento of the early work of our time-honored and beloved Society. Please express my regrets that I am not able to attend your forty-first annual meeting, and my hope that you may have a most pleasant and profitable gathering. Yours very truly, S. T. KELSEY.

Moved that a vote of thanks be given Mr. Kelsey for these photographs. Motion carried.

Professor Albert Dickens called attention to the absence of one of the "old guard," Mr. A. Oberndorf, Centralia, because of the death of his son, and moved that the sympathy of the Society be sent to Mr. Oberndorf. The motion carried.

LUTHER BURBANK AND HIS WORK.

A Sketch by PROF. W. A. HARSHBARGER, of Washburn College, Topeka.

About forty-five miles north of San Francisco, in Santa Rosa, is the home of Luther Burbank, the foremost plant-breeder of the world. The vine-covered cottage, which was his home until December, 1906, stands on a six-acre tract inclosed by a picket fence. To the casual observer this might seem the well-kept place of a country gentleman who gardens for pleasure. To the initiated, the whole place is of unique interest. The rows of boxed beds contain many rare plants from all over the world, as well as thousands of seedlings, each a part of some carefully planned experiment. Here is a bed of sweet potatoes from the Philippine Islands, which are too sweet to

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be palatable, while near by is a bed of wild potatoes from South America growing in rampant luxury and trying, as Mr. Burbank puts it, to take the place. In the corner a bed of marigold of unusual size, perfect shape and wonderful purity of color catches the eye. Farther on a bed of the new Australian starflower forms a beauty-spot, and next a bed of giant amaryllis of almost incredible size, perfect shape and marvelous color combinations stop one and hold him spellbound. Their equals could be found nowhere else in the world. Toward the front we note a fig tree sent him by the United States Department of Agriculture, a giant spineless cactus, a stately palm with its trunk covered with a hybrid *Ampelopsis* vine, a hybrid elm tree, a row of thistles learning to lay off their defensive armor, a bed of fragrant dahlias, and along the walk in front a row of six majestic hybrid walnut trees. Each plant is the result of an experiment, or a part of one still in progress. To some of these I shall refer later.

About seven miles from Santa Rosa, toward the foot-hills, Mr. Burbank has a tract of about eighteen acres, where his larger experiments are carried on. Here are thousands upon thousands of trees and plants of a bewildering variety of forms, from which a few will be selected and the others destroyed. An idea of the magnitude of Mr. Burbank's experiments may be given by stating that on this Sebastopol farm he has several hundreds of thousands of hybrid plums, about 8000 hybrid chestnuts, the result of crosses of Italian, Japanese, Chinese and American kinds; fully as many hybrid walnuts, the results of crosses of the common Black walnut, the Japanese, the English, and the Manchurian butternut; approximately 10,000 seedlings of the pineapple quince; thousands of peach and crosses of the peach and nectarine; at least 10,000 hybrid potatoes; together with thousands of plumcots, apricots, cherries, grapes, berries, grasses, and other forms too numerous to mention. In the course of his experiments he has worked on something like 2500 species of plants. It seems almost incredible that one man should be able to keep track of such an array of experiments, to say nothing of submitting each to that careful scrutiny it must receive; yet this he does, and as a California month has no more days in it than has the same month anywhere else, it is easy to see that he is a very busy man.

Mr. Burbank was born on a farm near Lancaster, Mass., March 7, 1849. His father was of English descent, and his mother was Scotch, of the family from which comes W. Atlee Burpee, the seedsman, of Philadelphia. Mr. Burbank's schooling was obtained in the public schools and a local academy. At the age of eighteen he was apprenticed to the Ames Plow and Spade Works, of Worcester, Mass., to learn wood-turning and pattern-making, where he remained three years. At the age of twenty-one he purchased a small farm near Lunenburg, Mass., and took up market-gardening and seed-growing. He here began to experiment with plant-breeding, working on the potato, grape, and some wild flowers, particularly the daisy. Here he originated the Burbank potato, which he sold to J. H. H. Gregory & Son, at Marblehead, Mass., for $150. According to an official statement of the United States Department of Agriculture, made a few years ago, this potato is adding seventeen millions of dollars per annum to the agricultural productivity of the country. This potato was sold in 1875, and in September of that year Mr. Burbank quit Massachusetts and settled in California. This was at least partially on account of his health, but probably largely because California offered an ideal climate for his work. At first Mr. Burbank

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rented a small nursery near Santa Rosa, where he cultivated small fruits and market flowers. At the start this did not yield large returns, and he sought work on farms about Santa Rosa to increase his income. In 1888 he bought his present place and organized a large nursery, by which he accumulated some capital. His experiments in plant-breeding were so much more interesting to him than the regular nursery business that he sold the latter part of the business about 1890 and gave his entire time to his experiments. In 1893 he issued his first catalogue of New Creations in Fruits and Flowers. From that time to the present he has applied himself to the production of new forms with a success so startling that it has caused the horticultural world to wonder and has led many of the foremost men in this line, both in this country and Europe, to visit his place and study his methods.

So far as I can learn, Mr. Burbank's methods are in the main the same as those of other successful plant-breeders. The main differences are the scale on which he works, using at times half a million of plants in one experiment, the breadth of his outlook, and the keenness of his perception, which enables him to note and take advantage of the most minute changes in a plant's form. He seems to form a mental picture of the form he wants and then to work directly and definitely toward that form.

The processes used may be conveniently grouped under four heads—change of environment, crossing and hybridizing, mutation, and selection. Change of environment refers to taking a plant from one locality and causing it to grow under very different conditions of soil, climate and cultivation. This alone produces some remarkable results. Crossing refers to mingling the blood of plants in the same species, the production of mongrels. Hybridizing is the same process applied to plants of different species or different genera. These processes are used to break up the life habits of the plants, and produce a wide range of variation from which to select. Selection accompanies all the other processes, or more accurately, it precedes, accompanies and follows them, and in some instances is used alone. For instance, by selection alone Mr. Burbank produced his crimson *Eschscholtzia*, White Iceland poppy, *Heuchera Cristata*, and several other forms. According to Doctor Jordan, a valid species of wheat has been produced by selection. Mutation, as generally spoken of, is not well understood. It refers to those forms that come suddenly into existence—the sports—such as climbing roses arising from bush forms, or different colored flowers. A case is recorded this winter, where in a house of 40,000 carnation plants of the variety Enchantress, nineteen separate sports occurred; while this is an extreme case, yet such sports are very numerous among hybrid forms, and sometimes occur in fixed species. A study of this subject in a less limited sense than the one I have used has led Dr. Hugo DeVries to write a large book in which he accounts for the origin of species by mutation, instead of gradual change as held by Darwin.

In addition to these processes, Mr. Burbank uses an elaborate system of grafting, thereby saving years of time in his experiments on trees. By this means he has reduced the time from the planting of a plum pit to its production of fruit to four and often three years. In taking up his separate productions, I can only allude to a very few, and shall choose those that seem to me not only the most remarkable, but also to be of the greatest economic interest.

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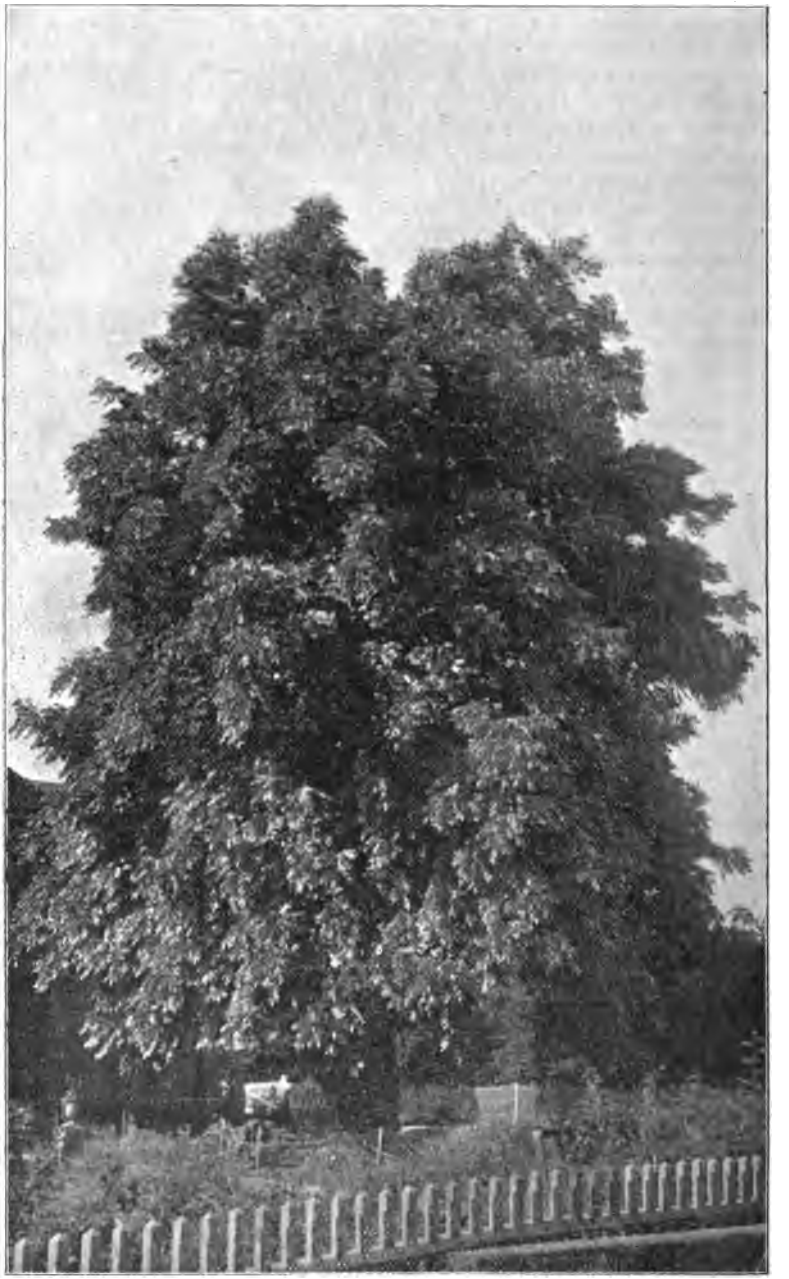

ROYAL WALNUT.
Sixteen years old, 100 feet high, 54 feet spread of branches, 3 feet in diameter three feet above ground.

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In 1877 Mr. Burbank crossed the English walnut (*J. regia*) with the California Black walnut (*J. Californica*). The seeds of this cross were planted in 1878. From these seedlings the most rapid-growing were selected and grafted onto other walnut trees, to hasten them into bearing. The experiment is still in progress, but has already given rise to the variety Paradox, a tree of very rapid growth, with large, fragrant foliage. When I visited Mr. Burbank's place I was much struck with a row of six of these planted in the hard clay along the sidewalk in front of his residence. Three of these have since been cut down to prevent crowding. In sixteen years they reached the height of sixty feet with a spread of seventy-five feet. The diameter of the trunks at three feet above the ground is twenty-six inches. The lumber is dense, and takes a fine, silky polish. This tree bears very few nuts. It is hardier than the English walnut, but yet not reliably hardy for cold climates. For milder climates it is an ideal shade-tree, and is proving one of the best foundations for the English walnut, and has immense possibilities as a lumber tree. I think it would stand our climate in eastern Kansas, but it might freeze back in our coldest winters. This tree was recognized by the United States Department of Agriculture in its 1896 report.

Another tree along this line, in some ways more valuable than the Paradox, is the Royal walnut. This is the result of a cross of the common Black walnut (*J. nigra*) on the California Black walnut, made in 1878. A tree of this variety, standing on a ranch between Santa Rosa and Sebastopol, is, at the age of sixteen years, 100 feet high, and has a spread of 54 feet. At three feet above the ground the diameter of its trunk is three feet. This is a very symmetrical, handsome, ornamental tree, with an upright growth. It bears freely nuts larger than those of the Black walnut. Its wood is very heavy, hard, close-grained, and takes a fine, silky polish. It will probably prove hardy wherever the Black walnut tree flourishes, and must become a valuable lumber tree. Last spring I planted six of these along with some 500 small nursery trees of various hardy kinds from eastern nurseries. The freezes in April and May killed them to the ground, but all but one recovered and made a growth of from one to three feet, while fully ninety-five per cent. of the eastern trees died outright. This speaks well for its ability to meet adverse conditions. Mr. Burbank has made a paper-shell walnut, one free from tannin, and has some 8000 seedlings, crosses between the Black walnut, the Japanese, the English and the Manchurian butternut. He has also some 10,000 hybrid chestnuts, crosses of the Italian, Chinese, Japanese and American varieties. Some of these bear at the age of eleven months from seed, and a few even earlier.

Among the many experiments Mr. Burbank has conducted to a successful end, perhaps none have so much economic importance as his spineless cactus. The thorough preparation he made for this experiment is also interesting, as it so happily illustrates the breadth of his outlook and the care and cost of the production of a new plant-form. In 1895, while seeking a forage plant for the arid regions, he turned his attention to the *Opuntia*. Through collectors he got seed from Mexico, Central and South America, North and South Africa, Australia, Japan, Hawaii, and the South Sea Islands, as well as from various regions in the United States, from Maine to California. These were planted and carefully cultivated. Thus he had spread out before him the *Opuntias* of the world, more than 150 species and varieties. Rigid selection was practiced on the uncrossed seedlings to get

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the best that each kind could produce. Many kinds showed that they could be made spineless by selection, but lacked other qualities. Having selected the desired plants, the next step was a complicated series of crosses, continuing through the blooming period. The seedlings from these primary crosses, as usual, show little variation; however, the succeeding generation show more marked change in very many directions. Some are far more thorny than their ancestors, a not unusual result. Some few show change in the right direction. These are carefully saved, recombined, and rigid selection again applied, and so on through the years until the desired result is reached in a cactus that at the age of three years is eight feet tall and weighs 1200 pounds, and is entirely free from spines and spicules. This, however, is only one of six varieties that he last year offered for sale.

Personally, I regard this as the most striking as well as the most valuable single achievement of horticulture. It takes a large view of the conditions of the world to appreciate its possibilities. If we remember that practically one-third of the land surface of the earth is arid or semi-arid, we get some idea of the field open to this newcomer. If we further study the conditions that often prevail in famine-stricken regions, we can get a more vivid idea of the need of a plant for desert conditions. As an illustration, in the famines of 1896–'97 and 1899–1900 in India, twenty-one millions of people starved to death. Any new crop that will put a stop to such conditions is of incalcuable value. This the cactus promises to do, for it is food for man and beast. In tests already made it has yielded at the rate of ninety tons per acre in six months from the planting of single-rooted leaves, and this, too, in heavy adobe soil and cool coast climate; on a sandy soil in a hot climate, with some irrigation, its yield would be much more. It produces fruit of a superior quality, with a sugar content running from twelve to sixteen per cent. Some varieties will produce as high as 18000 pounds per acre. The fruit ships well and is very palatable for those who like sweet fruit. It is almost certain to become an important factor in the fruit-producing business.

One of the chief points of interest to me in the production of this cactus was the bringing together of so many species and varieties from such widely separated regions and growing them for a time uncrossed, thus getting the best that each wild species could produce under new environments before any crossing was done. I notice this plan in many of his experiments. The Shasta daisy is another illustration of this. He got seed of the common field daisy from different places in Massachusetts, Pennsylvania, New York, and New Jersey, grew these for some generations, selecting the best, then on these best forms crossed the large, coarse English daisy, and on seedlings of this cross crossed the Japanese daisy. Here are these plants brought together from widely separated regions, and each made to contribute its part in the creation of an entirely new type. Such wide crosses produce a bewildering array of forms, and it requires very refined judgment to select those that will produce the desired result. Selection is Mr. Burbank's strong point, and by means of combined selection he gets some remarkable results. To some I have already referred. His race of columbines from which the spurs were eliminated and the size of the flower much increased is a good example, as is also the gladiolus that bears its florets distributed about the stalk, much like a hyacinth, instead of on one side, as in the ordinary type. In breeding up his race of giant amaryllis, after repeated crossings he selected for size of flower, and got a race in

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which florets a foot across were not uncommon, and with a remarkable range of color combination, but with stems too long and slender to hold up the flowers. By selection the stems were shortened and thickened until this trouble was entirely removed. His race of amaryllis is conceded to be the finest ever produced. I have had one bulb in a pot in my window produce seventeen flowers at one blooming, the smallest one nine inches across, and the largest a scant thirteen, borne on stems that needed no stakes.

Any account of Mr. Burbank's work, to be at all representative, must consider what he has done for the plum; yet here, as in other lines, he has done so much that the limits of this article preclude even bare mention of the different varieties produced. From the plum that bears his name, and which has won its way around the globe, and is to-day the most widely planted variety of plum in existence, down through a long list to Santa Rosa, introduced in 1907, and Formosa and Gaviota, 1908, there are enough famous varieties to establish the reputation of one man. There is in these varieties a wonderful advance from the simple to complex parentage, as instanced by Formosa, which has in it the blood of some eighteen kinds. In his block of some 300,000 hybrid seedlings are many other fine kinds which will yet be heard from. In particular, the block of pitless plums holds great promise, and is likely to yet revolutionize the plum industry. One variety of these has, I believe, been put upon the market by an Oregon nursery company. Many of them are entirely free from pits, but have not yet reached the standard of excellence that Mr. Burbank requires.

Allied to these is the Rutland plumcot, introduced in 1907. It is a cross of a hybrid Japanese-American plum on the apricot. It is an entirely new fruit. Mr. Burbank does not consider it perfect, as yet, but as it is hardier than the apricot and bids fair to thrive farther north, he has consented to its introduction. Mr. Burbank has made a large number of similar crosses to this, as strawberry-raspberry, blackberry-apple, blackberry-Mountain ash, plum-almond, peach-nectarine, etc. Some of these blossomed freely, but produced no fruit; some he has still under experiment.

Among berries, Mr. Burbank has originated some unusual forms, notably the Iceberg blackberry, the Primus-berry, and the Phenomenal berry. Iceberg is the result of a cross of a wild, yellowish-white form and the Lawton. It is large, of good quality, and pure white color. This was stolen from Mr. Burbank and introduced by other parties, but he now has even better white forms. The Primus-berry is the result of a cross of the California dewberry on the Siberian raspberry, and is now ranked as a true species. Out of a large number of seedlings resulting from the cross, Primus was the only one to fruit. The others bloomed freely, but failed to set fruit. Of 5000 seedlings of Primus all came true. Commercially this berry is not regarded as valuable, but is of considerable scientific interest. The Phenomenal berry is the result of a cross of California dewberry and Cuthbert raspberry. It is of nearly as great scientific interest as Primus, and in addition is a valuable commercial variety on the coast. It is a rapid grower and heavy bearer of very large fruit that ripens early. It would probably not be a success east of the Rockies. Mr. Burbank has also a race of berries free from briars. When he gets the quality of the fruit up to the required standard this will prove a valuable race, and this end is now in sight. He had also bred the elderberry up to a form with very large, pure white fruit entirely free from bitter taste. He is still at work on large numbers of its

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seedlings and hopes to make it a fruit of commercial value. Mr. Burbank seems to delight in taking up a plant that is generally considered a nuisance and elevating it to a position of usefulness. There are many other things that should be mentioned—hybridizing by grafting, and the like—that space forbids my touching. Interested persons will do well to consult the writings of Wickson, Jordan, DeVries and Harwood.

In closing, let me say that Mr. Burbank took up this work when our country was doing next to nothing in the line of scientific plant-breeding and when accounts of what had been done in Europe were not readily available. He began at the bottom and has worked his way steadily up to a position at the very top. Indeed, such an authority as Dr. Hugo DeVries ranks him as the foremost practical plant-breeder of the world. Even scientific plant-breeders, before publishing their theories, study his experiments and measure their theories by his observed facts. His experiments have been made on a scale never before attempted, and his observations are of the utmost value. Working independently, he has rediscovered many of the laws underlying the subject. Other so-called laws he has shown to be entirely inadequate. He has not made money in the modern sense of the term. In his own words, he has not had time to make money. He has met and surmounted difficulties that would have overcome a smaller man. When men of smaller calibre have snapped and snarled at his heels, he has gone quietly about his work, paying no attention to them, always letting results speak for him. Some of the results of his work we have in the new fruits, flowers and vegetables he has given us. Other and greater results will follow from the interest his work has already aroused. This is already apparent in the increasing number of books on the subject, the increasing amount of literature of a class above that which merely enables one to pass a pleasant hour.

This country is just beginning to do its share of the world's work in the production of new varieties of grain, fruits and flowers. Even now nine out of ten of our best varieties of garden roses come from Europe, not because they cannot be produced here, but because it is easier to import them. It stands to reason that forms suited to a certain soil and climate could be better produced in those environments than in entirely different ones. The work of Burbank will yet teach us to quit simply drifting and strike out boldly and definitely toward the forms that we need and to get them. This is no mere prophecy. Enough is now being done to show that the real workers are awakening. I hope Kansas is to do her full share in this line. No one can listen to the discussions in the meetings of this Society without being thoroughly convinced that the varieties of apples, pears, plums and peaches entirely suited to our soil and climate are still in the future. Let us hope that some of our fruit growers will set about their production. It is too much to hope that we will produce a Burbank. Such men are rare in any age. Theirs is the task of pointing out the way to the army of more humble workers. It took a Franklin to chain the thunderbolt, and a Morse to make of it a valuable public servant. When the army of lesser lights had brought to its seeming limits in the sending of messages on wires, then arose Marconi to point a new way, and show how to do without the wires. So in plant breeding. Burbank has blazed a broad, plain way into the vast field. Let others follow and fill in the details, and for the pride we have in our state let Kansas not be the last to take up the work.

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HIGH-CLASS TREES AND SHRUBS.

By PROF. ALBERT DICKENS, of the Agricultural College, Manhattan.

In discussing the matter of quality in trees, we may suggest that, as used by planters, the term high-class and high-quality trees have two distinct uses. Both are probably entitled to their use of the term, and we have at present no term to substitute, and are willing to use the term in its double meaning.

A great majority of Kansans are inclined to paraphrase the Kentuckian's classic remark, and insist that all trees are good—some may be better than others, but all are good; and having "done time" on the prairie farms that were miles from any wood growth of even switch size, I am not inclined to quarrel with the statement, but rather to enlarge and emphasize the clause that "some are better than others."

A high-class tree, to some of us, means a tree that has received such opportunity as enables it to make the very best of its possibilities. It has been pruned a little here, and checked a little there, until it approaches our ideal of the species form, and makes an outdoor picture that challenges admiration in spite of the fact that lumberman, forestry and landscape artist insist that its connections are not a matter of pride; that it is just "common folks," and not of the charmed numbers that have so long furnished poets and orators with material for song and simile.

The intrinsic value of a tree has ever been one of its charms. The Englishman who in ecstacy exclaimed, "Grand oaks that have for centuries been the landscape's greatest charm—and worth a thousand pounds per acre," had an eye not single to beauty for beauty's sake, but double for the landscape and the main chance. And the spice of commercial instinct that recognizes the wisdom of growing species that shall, at some distant day when their time as tree is ended, for other generations give pleasure to the beauty-loving eye as wainscoting or furniture, is not to be deplored.

Four principal points are considered in discussing the value of trees—the adaptability to climate, soil, and location; the rate of growth; the appearance while growing, and their value when grown. The first is a necessity, as no planter wants a tree that may be injured by drought or cold. Trees that kill back seriously are not wanted.

The rate of growth has been given precedence over all other points by many Kansas planters. We wanted trees and we wanted them in a hurry. And we were right, too; but the pioneer planting has been done in a great part of the state, and the next point, the appearance while growing, is of increasing importance. This is the all-important matter in trees planted for the artistic value. This tree, to fulfil its mission, must be a picture—a picture that will give to every observer some good thoughts; not merely a chance to calculate how many board feet or cord feet, or posts or poles, but an impression of grace and symmetry, strength and vigor, form and color, that is restful and lingers in the mind, an impression of the union of beauty and grace, and the desire to look again.

This quality, or high-class attainment, is possible in some degree in a well-grown individual of any species. We even forget the bad habits as we forget them in our other friends when they measure so nearly our idea of perfection in some particular. Even the plebeians among trees, the box-elders and willows, when well-grown and symmetrical, have their good points; and grown by a master hand, or, better, say a master mind, that has taken

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proper measure in thinning and pruning, they betray none of the gross defects that are theirs when, neglected and unloved, they have been hacked and hewed in some well-intended but poorly directed efforts at reformation. Reformation with trees, as with men, is rarely satisfactory. The scars show the effort to do, too late in life, what should have been done with the sapling. It takes some work to grow a good tree; some work and more thought; nothing like the amount of time and nerve force, though, that it must take to paint a picture. And you look at the picture and say, "How natural," and wonder, perhaps, what kind of a tree it is supposed to be, and forget to look out at the real tree whose life has been a continuous blessing, and the study of whose structure will disclose no make-believe, but an infinity of detail and perfection that makes the artist's painstaking touch seem awkward and poor indeed. You may hear much praise for the wall-paper or table-linen whose pattern may be identified as White oak or Black oak leaf, from those who hardly notice the great original design as they pass it by.

The men I'd like to talk to are not here. Members of the horticultural societies know these things, and it is as discussing books with many who have read more than I, that I am to show you to-night a few views of some of the trees I believe entitled to be placed in the high-class group.

The funny man of the papers and the occasional fussy councilman who worries over the cotton nuisance, cannot materially change the standing of our pioneer tree, the cottonwood. This well-developed, symmetrical monarch is only a youngster of forty years. Its rate of growth more than compensates for the cotton nuisance, and our cottonwoods for ornamental planting from now on will be grown from cuttings from staminate individuals, and the cotton nuisance forgotten. The one who wants to grow a big tree in his landscape during a single generation will still plant a cottonwood.

The rate of growth favors the Soft maple, and it is one of the good shade-trees for sheltered locations, but the brittleness of the old wood is its undoing, and fewer Soft maples are being planted each year. The maple of Norway makes as good a tree as the man from Norway makes a citizen—I need say no more. The symmetry of this specimen is typical of the species. Its harder wood compares well with that of the Sugar-maple for strength, and it is a better species for Western planting than the sugar-tree.

One of the surprises in store for the planter who thinks of Osage as a hedge plant is the fact that with careful attention during its early life and some occasional prunings thereafter, an Osage orange tree may be made a thing of considerable beauty. It takes work, but for high, dry and unfavorable locations it is well worth while, and the rich, glassy green of the foliage and the sturdy strength of a well-grown tree will go far toward compensating for the care necessary to avoid its thorns.

Speaking of thorns brings the Honey-locust to mind, and the two pictures are suggestive of the adaptability of this species. This tall, straight one grows in a group, and is so strong and straight that you wonder it is the same species as this one, which in its forty-five years of growth has made a spread of sixty feet and a height of but forty. But it has fought its battle alone, a hundred feet from any neighbor; it has made for itself the condition it needs, and in so doing a shelter for countless birds and shade for more. This species has many thornless individuals, and it is well worth the while to take the pains to select these for street or park planting. The Honey-

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locust is so common and grows so well that it is often classed as a cheap tree, but its foliage, its strong form, and, for a change, its unique appearance when the whitish green of the long, flat seed pods contrast with the brightish green of the leaves makes a most pleasing picture. These seed pods may be a nuisance, as they fall and litter your yard, but they suggest the ability of this species in the matter of forest extension.

The coffee-bean, with its thick, fat pods clinging to the bare branches until spring, is one of the picturesque trees native to Kansas. Its long, graceful leaves produce in summer an effect you would hardly expect from a species whose poverty of small twigs and branches suggested its genus name, *Gymnocladus* (naked branch). This species, native of the rich bottom-land of eastern Kansas, is proving well adapted to upland soils even as far west as Hays.

Of the trees whose blossoms add a charm during the season of bloom, the Black locust has been often praised in song and story. J. Whitcomb Riley has his

> " . . . mem'ry focussed on the past so mighty plain
> I can even smell the locust blossoms bloomin' in the lane,"

and no one can soon forget the sight and smell of a row, group or even a single good tree well filled out with flowers. But the poor texture and the frequent attacks of borers incline us to condemn this otherwise useful species.

For a week or ten days a well-grown catalpa in full bloom rivals all others in splendor, and you forgive it for its tardy foliage, its early leaf-fall, and the litter of seed pods. You really cannot expect such glory to last longer, nor to appear without some few faults.

The tulip-tree, the "yellow poplar" of Indiana and Kentucky, whose yellow, cup-like blossoms appear in early summer and last for two weeks or more, is good in every way—foliage, form, and in every way worth the effort to establish it. This species has succeeded very well in the eastern half of the state, but is rated as somewhat difficult to transplant.

Whoever has grown an oak has something of which he may be proud. In the matter of quality they have no superiors. Of all the tests applied to trees they are criticised in but one particular, the rate of growth, and yet any oak, even a baby oak, makes a picture. Well-grown nursery trees, five to ten feet high, may be obtained readily, and are not so difficult to transplant as to discourage the tree lover. A thrifty oak, six feet high, well branched and in full leaf, is a thing of beauty. In full foliage, with every leaf worthy the attention of the designer looking for patterns, you will be glad you own it. As its color changes in the fall and you see the varying shades of red and brown challenge comparison with the work of any Old Master, you will be proud of it, small though it may be. And as it stands through the winter months, erect of stem and symmetrical in branching, it adds no small amount to your winter landscape. The species which retain their foliage throughout the winter are rather more conspicuous than others. I find that artists differ in their judgment of these trees, some insisting that they have a "died before their time" appearance, and present for too long a time the "sere and yellow leaf"; but most tree lovers are fond of the Pin oak and the Shingle or Peach-leaved oak, and worthy they are. They rank among the most rapid growing of the oaks, and their symmetrical, regular form, fine color, both summer and fall, lasting well into the winter, make them especially desirable for avenue and park plant-

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ings. The fall color of our Red oak entitles it to a place in every planting made for appearance, and it is a very good tree all the time in every particular. The Black oak is less gaudy, but a worthy companion.

In the White oak group, the species which gives it name, the real *white oak, Quercus alba,* furnishes plentiful variety. As its leaves open they are the most beautiful, delicate, rosy pink; then for months they offer a pleasing contrast whenever the wind stirs them so as to show the lighter under surface; and the fall color, while less brilliant than the Red, is not less pleasing.

The good Burr oak is always worth planting. It is the one oak that everybody recognizes, the very "oakiest oak" of them all. The first year from the acorn it shows you the rough bark and the strong stem that makes you glad another oak tree is born, and it is, throughout its long life, a tree to furnish inspiration to poets and texts for preachers. I cannot show all the oaks, but all are good. The Chestnut oak and the Willow oak, the swamp White oak—all are trees worth having and worth knowing.

No planting, however small, but must have some of the evergreens. No locality in Kansas but may grow some of them. Only one, the Red cedar, is widely distributed, but you may find it growing sturdily in *every county* in Kansas. There are more beautiful trees in the evergreen list. It sometimes grows open and a bit ragged in old age; sometimes the rust makes it less vigorous; sometimes, in a long, dry winter, it is a rusty-brown color rather than a good green; but, like the sturdy Jayhawker, it always outlives its troubles, and it always adds something to the picture of which it is a part. Once established, no tree is hardier, and every Kansas planter who has room for two trees should have one Red cedar.

The Austrian pine is unexcelled for symmetry and deep, dark green. It is always good, and particularly so when the new growth starting gives the appearance of white candles all ready for lighting on every terminal. The Scotch pine is less reliable as to form, often grows irregularly, and gives greater variety of foliage, varying from bright-green to light glaucous blue. The trees shown are thirty-five years old, and have averaged eighteen inches of growth per year. Of all pines, the White is the monarch when well grown. Its soft, silky foliage, dark-green and abundant, its strong, supple trunk and evenly distributed branches make it a model in tree perfection. It deserves more attention from planters in the eastern half the state.

The spruces have long been the aristocrats among trees. While young, their close, compact forms, their regular, good color, and their usefulness wherever a formal tree is wanted, entitle them to special mention. Good as are the White and the Norway, the real royal tree is the Colorado Blue spruce. The best individuals are really better than any combinations of delft-blue seen anywhere; real studies in blue, shading from the dark shade that meets green on the older leaves to the delicate baby-blue on the young growing shoots. The nurseries are the only ones that ever sell good blues. You could not any more buy a good blue from a man that has grown it a few years than you could buy his baby.

Just one more that I must mention, the Douglas—spruce, the nurseryman says—fir, *Pseudotsuga douglassii,* the botanist says we should say. But while it has not been so successful as the spruces, it has been sufficiently so to warrant it being recommended to all who love trees enough to make them

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grow. Its color varies, sometimes almost as good as the Colorado Blue, to a deep, good green, and it is always symmetrical, a very model of form.

If you have not room for a tree, plant a shrub; if you have, plant both, for a combination of trees and shrubs is one of nature's favorite compositions. Some shrubs are magnificent for a brief time, others fairly good most of the time, and some satisfactory always. Of the latter class, Van Houtten spirea is well up in the list. It is a mass of white when in bloom, graceful in foliage and form while in leaf, and fairly good form in its winter condition. Billard's spirea and Anthony Waterer are desirable. If you have room for these species, you ought to have them.

Honeysuckles, of course! The sweet-scented one is nearly evergreen; usually holds its leaves well into February. Then early in April the sweet-scented flowers are soon followed by the new crop of fine green foliage. The Latarian honeysuckle is a good bush, with foliage enough to hide the stiff stem, good in flowers that are followed by the bright, yellow-red fruits.

The lilac you must have for old acquaintance sake, and a few of the newer varieties will tell you of the progress the plant-breeder has made.

The mock-orange, or *Philadelphus*, the syringe bush of your grandmother's memory, is worth a place in every large yard. So is the snowball, with its early spring glory and its late fall brilliance of foliage, and its near relation, the high bush-cranberry, with its load of crimson fruit in the fall. So are the barberries, purple leaved, big fruited, and the Thunberg, dense of form, nearly evergreen of leaf and bright of berry. So is the hardy hydrangea, that comes along with its masses of white during the heat of August and furnishes decoration for the early September weddings, then turns pink and later greenish before it withers.

You really ought to have a tamarix or two, particularly if you find it hard to grow shrubs, and a fringe-tree and a spicebush, if you can grow them easily, and a Wahoo for the bright fruits of the fall days. And if you are not afraid to use the grub-hoe and ax occasionally, and have a stony, poor corner that needs something, a few sumac, either the new cut-leaved one or the good old one which is graceful and green all summer and then furnishes the first good red of fall. And in a low spot, maybe where a drain-pipe empties, a mass of elderberry will give right good results. Cut back each spring, the strong growth and the late bloom will surprise you, and I believe that you will agree to include even these outlaws in your list of good shrubs.

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THIRD DAY—MORNING SESSION.

SATURDAY, December 28, 1907.

Meeting called to order by Vice-president Snyder.
Prayer by Rev. O. T. Deever, of the United Brethren church, Topeka.
The following trustees were elected for the ensuing two years:

First District, F. W. Dixon, Holton.
Third District, F. L. Kenoyer, Independence.
Fifth District, Prof. Albert Dickens, Manhattan.
Seventh District, C. A. Blackmore, Sharon.

SMALL FRUITS.

By GEO. W. HOLSINGER, Rosedale.

The past three or four years have, to the fruit grower in our section of the state, been years of experience. We have encountered about every imaginable manner of discouragement that flesh is heir to, and have often been led to wonder if Shakespeare did not have us in mind when he talked through Hamlet of having "to bear the whips and scorn of time." Surely none of us can say that nature was not scornful a couple of nights last May.

We have had a splendid chance to find out that some things we have counted on will not do; important knowledge, albeit unprofitable and in some instances triflingly discouraging, if it can be said of the fruit grower that he is ever discouraged. He is a type of man who indulges in the illusions of hope. Our president, no doubt, is just now indulging a thought concerning the Jonathan apples.

We talk of things being as free as air or sunlight. What nonsense! Why not speak rationally, of things being as free as hope in the bosom of the fruit grower. What matter if we have the hardest freeze on record one year, the drought the next, then three or four rainy seasons in succession, and finally one of the coldest nights of winter in May, and that in the latter part of May. Does that destroy hope for us? Not so. We have hope for the largest crop of raspberries on record next year. And why not; the ground is clean, the patch is two years old, on new ground and in ideal condition; and why not hope for better things next year as we hope for brighter, better things in the beautiful, unknowable beyond? Hope is the stock in trade of the horticulturist, and the fruit grower who does not indulge in its joys is likely to miss a source of real comfort in his calling.

Success in small-fruit growing depends on knowing what will do and what will not do. Perhaps it is not unfortunate for us that we have never been able to set down rules absolutely governing conditions for success in our business. It may be a part of the Divine plan to make real men of us by having created conditions that we must master. And one nice thing about it is that if we cannot command success, we can deserve it, which is worth more. However, it is so. Our rules are only general rules, and it has been proven time and again, beyond a reasonable doubt, that treatment of a certain kind for a fruit patch in one section of the state is not necessa-

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rily a practical way to handle the same variety in another section, to say nothing of different varieties, on different soil, under different conditions of wet and dry and hot and cold.

If it could be demonstrated that a particular variety would do at least reasonably well under the same kind of treatment in the different sections of the state we would still have to work out the rest of the problem that confronts the fruit grower, viz., the variety to plant.

Fruit grown for local market, where it is carefully handled and consumed within twenty-four hours after picking, has usually different characteristics from the fruit which is expected to stand up for days and withstand the rough handling it receives in long-distance shipments. Varieties that pay well on the local market are sometimes of little value for shipping.

It should be constantly borne in mind that papers read before this Society treat generally with local conditions and are to be regarded as presenting particular results. Very few of us have the pleasure of observing methods and conditions outside of our county, and so when I tell you that our experience is thus and so, it should mean to you that I am reporting on a local condition that does not necessarily fit in your case.

In presenting thoughts for a meeting of this kind, representing so many different conditions, we should be careful and not jump at conclusions. Above all we should not take one season's results as a basis from which to judge the merits or demerits of a type or variety, for a single season may be exceptionally favorable or exceptionally unfavorable, and conclusions thus obtained may be and quite frequently are erroneous.

The cultivation of small fruit generally is a tedious and laborious job at the best, and must ever be so because of the great amount of manual labor necessary. To neglect for any reason, even for a short time, in the growing season, is often disastrous, for the cost of cleaning out is not only greater but the smothering effect often materially injures the plant. Sometimes, as in the strawberries, great injury is done by having to pull weeds, the strawberry plant coming out with the weeds or being loosened in the ground. The old adage, "a stitch in time saves nine," expresses it pretty well, but it often happens that we cannot take the stitch; at least it is so with us, for, with the multiplied work of warm summer, the picking season, and the men going off to the harvest fields, we never yet have had a season that something was not neglected; and, I might add, there was never anything neglected that we were not sorry for it. If there were no injury from neglect, it would still be cheaper to keep the ground free from weeds. It costs as much to clean out the weeds as would the necessary cultivation, if applied at the right time.

Some kinds of fruit are not easily kept in good condition, particularly late in the season, when cultivation must necessarily be stopped. Raspberries, blackberries, dewberries and the like spread to such an extent that the passageways between the rows are closed, and if cultivation is continued it is likely to work more or less injury to the growing wood. If the ground is kept clean, we have no assurance that morning-glories and like-growing weeds will not come on after cultivation must necessarily stop.

Sometimes, on hilly ground, a light cover crop is desirable to prevent washing. But if there is much trash on the ground there is great danger from fire, and we who live along the railroads and near large cities, where there are lots of trespassers, know something of this great danger.

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Field-mice and rabbits like nothing better than a raspberry patch that has been allowed to grow to foxtail and crab-grass. So everything seems to be in favor of clean cultivation where it is possible to give it. We hear a great deal of talk about rotation of crops for cereals and general farm products. I believe it is coming to be as necessary for the fruit grower to rotate his crops as it is for the grain grower. The grain farmer rotates because of soil exhaustion; the fruit grower to get rid of insects and fungus. We cannot expect to rotate fruit as often as grain, but it is my opinion that when a field of berries begins to run down the best thing is to plant another field somewhere else and plant that ground to another kind of fruit. The raspberry, for instance, usually ripens good crops until seven or eight years old; they seldom do well after that. For some reason, either from continued cultivation, or from the crown growing upward, or from the washing away of the soil, the crowns after a few years are all pushed out above the surface of the ground and have a generally unhealthy appearance. Then, too, old patches suffer more from fungus diseases and are generally unprofitable.

With blackberries the same thing is true, and fields where rust develops usually have to be abandoned in a few years and planted to something else. Gooseberries are short-lived at the best, and when the gooseberry begins to fail there is little hope for it. Strawberry plants that have fruited do not send out new plants readily, and after two or three years become so infested with insects of various kinds as to be entirely unsatisfactory.

And so experience of the last few years plainly indicates that rotation is coming to be very necessary in order to get away, partially, at least, from insects and fungi.

There is one serious drawback to rotation; all small fruits are not suited to the same kinds of ground. Raspberries delight in a rich black soil, while blackberries prefer a clay subsoil with a sandy loam top. And since this is true the individual will be at the painful necessity of working out his own scheme of rotation to suit his own soil, elevation, and drainage conditions. We have come to find also that elevation is a very important factor, not only in small-fruit growing, but in fruit growing generally.

The fruit-buds at blooming time are very susceptible to frost injury and there are no successful methods of guarding against it. When it is possible fruit should occupy the high ground, which often escapes a frost that seriously injures the fruit on adjacent lower ground.

It sometimes happens that a belt of standing timber across the lower end of a draw will cause the damming up of the cold air, producing a frost on the hillside, while lower altitudes are not affected.

As to varieties to plant, it is a pretty hard matter to advise another, as there are so many varying conditions to be met.

At present we are planting Warfield, Dunlap, Aroma and Marie strawberries; Kansas and Cumberland raspberries, and of the reds, Loudon, Thwack, Miller and Cardinal; of the blackberries, Snyder, El Dorado, Kenoyer, Mersereau and Early Harvest; all seem to be profitable sorts. The Houghton gooseberry is the only one we have tried that is of much value to us. However, it is only fair to say that we have only tried two or three kinds. Downings are still in great demand, so I suppose some people are making money growing Downing. Of the currants, Red Dutch, Cherry, Red Cross and North Star all seem to be more or less popular. We have quit growing all kinds of currants; other things are more profitable for us.

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THE STRAWBERRIES FROM PLANTING TO FRUITAGE.

By B. F. SMITH, Lawrence.

PRELIMINARY PARLEY.

The strawberry gives more satisfaction to planters and consumers than any other berry fruit raised on American soil.

There are more points of excellence in the strawberry than in any other berry fruit. There is a greater area of land in the United States devoted to strawberry culture than there is in all the nations of Europe. The strawberry is being grown successfully from Maine to Oregon, and from Lake Superior to the Gulf of Mexico and Florida.

Some varieties are more prolific than others in certain localities, but the commercial growers can grow them on top of the mountains, in the valley, or out on the plains of Kansas.

SOIL FOR STRAWBERRIES.

The strawberry will adapt itself to a great variety of soils and locations. Different varieties require somewhat different conditions of climate and location.

To make success more sure we must have good soil, and that well prepared for receiving the plants. The preparation of the soil should have a beginning the year previous to planting by the cultivation of some garden vegetables or crops, such as beans, cabbage, Irish or sweet potatoes, turnips or tomatoes. Where these crops have been thoroughly cultivated and kept clean, there is no place about the farm that will equal it, for all soils are kept alive and active by much stirring and clean culture. After these crops have been gathered the land should be plowed as late in the fall or early in the winter season as possible, before hard freezing. The following spring make the surface level with the harrow and a leveler.

PLANTING THE BERRY PATCH.

The most successful berry growers plant as early in the spring as possible, and the roots of the plants should be clipped or shortened in. For commercial growing, set in rows from three and one-half to four feet, and eighteen to twenty inches apart in rows. For setting plants I have always used a garden trowel, and a line to made the rows perfectly straight. Many planters, however, use a spade for opening the soil, and a boy, with a bucket, carrying the plants, places the plant back of the spade, which is thrust in the soil at an angle of forty-five degrees. The plant is held by the boy until the spader presses the plant firmly in the soil with his foot. Some berry men claim that is the fastest way of planting; but I never succeeded as well with the spade as with the trowel. Some large strawberry growers have machine planters moved by horse power that plant five or six acres a day.

CULTIVATION.

At the beginning one should work around the plants very tenderly with a light steel rake, after which use a hoe to clip the young weed growth. The second cultivation should be done with a light fourteen-tooth cultivator. This is the best implement for thoroughly pulverizing the soil into fine particles. By using this implement every ten days, and also by stirring soon after hard, beating rains, the soil can be kept in fine shape throughout the season. This cultivator can be worked so closely to the plants that but few weeds will be left for the hand-weeder.

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When the young runners start out to set themselves in the soil the mark made by the outer tooth, or outside of the cultivator, beside the row, leaves a fine place for young plants to establish themselves in well-pulverized soil. Then, by the next cultivation, there will be another lot of runners ready to fall into line an inch or two from the last ones set. By thus training the runners the rows gradually widen until they are from sixteen to twenty-four inches wide.

In case of long spells of wet weather weed growth may become so strong that the pulverizing cultivator cannot destroy them. Then the five-tooth Planet cultivator must be used to destroy the weeds, so that the pulverizer can be used thereafter. Weeds that appear among the young plants that are taking root will have to be destroyed by hand weeding.

It requires careful attention from planting to the last of September to get well-balanced rows of plants for fruitage the second year after planting.

WINTER PROTECTION.

The importance of mulching is well understood by all commercial berry men. All young berry fields of one season's growth should be well covered with first-bottom prairie hay or wheat straw that is free from chaff. The strawberry is a thirsty plant when loaded with berries, and during dry spring seasons a good pile of straw kept near the berry patch to fill the spaces between the rows will greatly assist the crop to better fruitage.

SOME POINTS ON POLLENIZING.

Pistillate or imperfect varieties will vary in size and product when pollenized by different staminate varieties, so if a firm berry is desired pollenize with a firm variety. If size is desired, pollenize with a large berry. In fact, whatever peculiarity you wish to transmit to pistillate, seek it in a perfect sort to pollenize with.

DO STRAWBERRIES DETERIORATE OR RUN OUT?

Some varieties wear out by being planted on poor, thin, poorly prepared soil, followed by slack moisture. The strawberry will also soon deteriorate if kept in the same field, when the new plantings are set where old beds have fruited two or three years. There should be an interval of at least three years (and five is better) before using the soil again for strawberries. During this three or five years' rest the ground should be sowed to Red clover or cow-peas, or manured and devoted to garden truck under thorough tillage.

OUR IDEALS.

The ideals of many berry growers are still in the shadows. The perfect strawberry is not yet in sight. The ideals of a few berry men are great size, and others large product, and yet others superior flavor.

But all these requisites will hardly be found combined in any one variety. In all my forty-two years' life among the strawberries I have never seen a very large strawberry that, in a commercial sense, was a profit-bearer, neither had they any superiority in taste, but as a rule were inferior when compared with or tested by a smaller variety. A desire for higher ideals keeps a small army of experimenters in the field planting seeds, fertilizing with the best sort of berries, with an intense desire to reach results surpassing all previous productions. Yet, with all of the anxiety that goes with the originators, they have not been able to very much excel the chance seedlings found by the wayside.

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WAYSIDE SEEDLINGS.

The famous old Wilson Albany, that was for more than thirty years the foremost strawberry for commercial traffic, east and west, was a chance seedling. The well-known Crescent was a foundling by a berry man of Connecticut; so were the Warfield, Bissell, Bubach, Mickel's Early, Bederwood, Aroma, Haverland, and Splendid. The Jessie, Timbrel, Saunders, Edgar, Queen, Greenville, Crawford, Sample, Dayton, Marshall, Wm. Belt, and others that I cannot recall, were thé product of experimenters. There is not one of the above list that is as productive as the Splendid, Warfield, Bissell, or Parker Earle, and several of the above varieties are not grown for commercial traffic. The Jessie and one or two others are catalogued by the nurserymen. The Beverly, Saunders, Marshall and Dayton are rarely found in the catalogues. So, after more than forty years' experience in strawberry history and commercial berry growing, my conclusion is that the wayside or chance seedling has done more profitable fruitage than any sort introduced by experimental experts. But I would not throw a straw in the way of the man who desires to produce the ideal. He is in pursuit of a more perfect variety, whether he finds it or not, and he will make some interesting discoveries that may somewhat satisfy the wants of the commercial grower and the seeker after exquisite taste in strawberry fruitage.

FRUITAGE.

About the 10th of April the berry patch planted last year should have the attention of the planter. The straw must be removed from the rows of plants into the spaces between the rows, to keep the ground moist in case of spring drought, and the berries from being soiled by showers of rain during the ripening season. Should any weeds come up in the rows they must be removed by hand pulling, so that berries will not be overlooked by the berry pickers.

About the last of April the bees will be out in the berry patch, seeking food among the blossoms, for manufacturing honey. They scarcely get credit for the work they do for the berry man. They are our chief pollenizers. One bee will pollenize 10,000 blossoms in a day, hence the berry grower should encourage bee-keeping not far from his berry patch if he does not keep them himself.

The fruitage of the strawberry season is to the writer the happiest season of all the year. All nature is in a fresh, renewed state of life. The sweet-singing birds from the forests of the Southland will come in flocks as hungry as wolves, and sing you a few songs and steal a few of the first berries that ripen.

The children just out of school will be seeking the near-by berry patch to appease their thirst for the health-restoring fruit. Sickly, careworn people of the cities, too, seek the market places for the early fruits to satisfy the mouth and renew their youth. And the berry planter may get his reward for the labor and money expended in growing one of the most appetizing, soul-satisfying fruits that is grown on American soil.

The fruit growers of Kansas have much for which to feel proud, and little to regret, in the story of strawberry and orchard fruitage. Now strawberries are grown in almost every county in the state.

It required more energy and courage for a man to succeed with fruit in Kansas in the early years of Kansas history than it does now. Then fruit

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culture was an experiment. Many of the early settlers failed in their first efforts and returned East. Others continued the experiment until they were rewarded with profitable crops of apples and berry fruits. Owing to adverse climatic conditions, Kansas and Missouri have suffered untold losses in orchard and berry fruits. The grudge that the weather has had against us we trust will not continue next year, and that we will have a crop of all sorts of fruits that will be a source of joy and profit.

A MEMBER: How many years do you calculate your strawberry patch will last profitably?

MR. SMITH: Three years; this year the third crop paid me better than if I had plowed it up and planted it again; but as a rule two crops reach the limit of profitableness. The reason this third crop proved remunerative was that we had two frosts down there in our county, and these plants have not had their vitality weakened because they have not borne a big crop.

MR. GILMORE: I would like to inquire as to whether you grow in the hedgerow system, single or double, or the hill system?

MR. SMITH: The hedgerow—the hedgerow, every time.

A MEMBER: Narrow, or wide?

MR. SMITH: I have had the best success with the wide. Suppose you have a frost; you know the wide row stands it better than a narrow row.

MR. GILMORE: Another question: I am about to set a new plantation of berries on ground which had not been plowed until last spring. Could I reasonably expect a fair crop of fruit from that or will it grow largely to vine?

MR. SMITH: What kind of a crop have you grown on that land?

MR. GILMORE: It has simply been sown to blue-grass and sweet-corn, well tended and the corn has been kept clean.

MR. SMITH: Is the blue-grass all dead?

MR. GILMORE: Nothing there now but the naked ground.

MR. SMITH: Did you break it this fall?

MR. GILMORE: No, sir.

MR. SMITH: It ought to be broken now, this morning. That would be much better. If the ground had been pulverized half a dozen times it would have been all the better.

MR. GILMORE: This is very rich ground, and I have feared it would go more to foliage than to fruit.

MR. SMITH: Well, it is according to variety. I have never had any too much foliage on any ground I ever worked. I once put two or three wagon-loads of guano—pigeon manure—on my strawberry patch. I put it on too thick, and that was the only year I ever had more foliage than fruit.

MR. GILMORE: There is one question more I would like to ask. Is it necessary to fertilize the Gandy with some other variety?

MR. SMITH: The Gandy is a perfect variety.

MR. GILMORE: The Gandy has been considered a perfect bloomer, yet my experience has been that a large per cent. of the Gandy bloom is smooth, and the result is my crops of Gandy have been limited. I see that some plant growers advocate the planting of other varieties, like the Aroma or

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Downing, or some other variety equally successful, as a fertilizer with the Gandy.

MR. SMITH: That is something worth studying. I myself have wondered why the Gandy did not bear better. The Gandy is a pollenizer. The old Glendale is the best pollenizer I ever used, and it would pay to plant Glendale simply for that purpose. I have always grown the Gandy, but I have never been profited much by it.

MR. GILMORE: We will name varieties and can then perhaps work out the points. For instance, in fertilizing the Bubach, it being a late berry, would it not be wise to fertilize with the Senator Dunlap on one side and something like the Aroma or Drummond on the other side? In that way we catch the early bloom of the Dunlap and the late bloom of the Aroma or Drummond.

MR. SMITH: You might plant say a pistillate on one side and different fertilizers on the other. One on one side and one on the other. I plant mine now three pistillates and three staminates.

A MEMBER: You mean by that that you plant three of one kind and three of another?

MR. SMITH: Three rows of Crescent and then three rows of Splendid.

MR. FERGUS: Do you want birds?

MR. SMITH: Birds? Yes, I want some song-birds; some mocking-birds.

PHILLIP LUX: Which are the most profitable, the staminate or pistillate varieties, in your experience?

MR. SMITH: The last few years the Dunlap and the Splendid, both being staminate varieties, have been the most remunerative. The Splendid has been the greatest profit bearer I have had for the last ten years. It is not quite as productive as the Crescent and Warfield.

A MEMBER: I want to ask, as an amateur, what would you plant in a small patch for permanent use?

MR. SMITH: I would plant Splendid, Warfield and Dunlap. It is best to let the plants of the Warfield grow thickly.

MR. DIXON: I ought to add a little to that list of strawberries, that is, a few suitable early ones, something like Gandy or August Luther.

A MEMBER: How about Aroma?

MR. DIXON: The Aroma did not do well with me; Aroma will not do well on heavy, rich soil. Will do better on upland. Mr. Smith wanted to know in regard to our machine for planting. It has been in common use with gardeners. You can do better work with it than can be done with the average men you hire to plant strawberries. It takes three good men to run the machine, and if you have the right kind of a man on the seat you will get a much better job done than you can do by hand; you can get the plants in in better shape and get them in quickly, and they are not exposed to the atmosphere any length of time. I am a great believer in machinery. An important piece of machinery for handling newly planted strawberry fields this last season was the packer. I don't believe we would have had a stand of plants if it had not been for the packer. The ground dried out and froze out two or three inches deep, until the plants died. This roller is about the greatest tool we ever used, and under such conditions as we had last spring

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it was an absolute necessity, and it is useful for preparing soil at any time. Of course, I realize that the grower of two or three acres cannot afford a thousand dollars for machinery.

A MEMBER: What kind of cultivators do you use?

MR. DIXON: We use a double cultivator with seven shovels on a side, and if rows are planted with the machine an even width we cultivate anywhere and anything. The planting machine is made adjustable so that the rows can be planted at different widths.

A MEMBER: What kind of a tooth has the cultivator?

MR. DIXON: You can use different kinds of shovels. Of course, we use the little cultivators in certain circumstances. Always cultivate two rows at a time. Cabbage and tomato plants can be cultivated with the double-row cultivator.

MR. CROW: How long is a patch profitable with you?

MR. DIXON: Take a plant like the Gandy, and they will get better for three or four years.

MR. CROW: What if you lived in a locality where the Gandy would n't do well?

MR. DIXON: I would throw it aside. Some varieties will not do well under irrigation. An irrigation country requires entirely different varieties from ours. In Colorado they are partial to the Glen Mary. Last year it did fine, but it must have the best of cultivation and be planted on the very best kind of soil. It won't stand any kind of slighting at all. There is another good variety, and that is the Arnout. It was introduced two or three years ago. It is a very large variety. The Craig, introduced with a great boom, has not proved profitable with me. It will not stand the climatic changes we have had the last few years. The plant is tender when you transplant it. The Wealthy is tender if transplanted. I will take the Excelsior for a market variety, but if you would put all the sugar you had on one berry you could not make it sweet.

MR. KENOYER: I would like to ask in regard to the Gandy being a pollenizer. With us, where we have no bees, the Gandy never does well set in a block by itself. Several years ago I saw something was wrong, and I planted three rows of Gandy with three rows of some late variety which was a good pollenizer; this proved a remedy for the defect. The Aroma is a good variety to plant with the Gandy.

A MEMBER: Have you bees?

MR. KENOYER: They do not last a year with us.

MR. DIXON: Mentioning bees, Mr. President, a man lives across the road from our place, and I suppose he has 100 to 200 stands of bees. I have walked across my strawberry field when they were in full bloom without seeing a bee. Many and many a time I have not seen a bee in that field when crossing it.

MR. SMITH: I was going to speak of bees. I think bees a great help. I never raised a bee, but I have seen bees in my patch.

MR. BLAIR: I want to say a word for the bees. It may not be generally known, but honey is not secreted at all times of the day in all plants, and some plants are particular as to the hour. Then consider the conditions of

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the season, dews and rains, and winds and hot sunshine. The bee seldom goes into the patch for gathering nectar until about eight or nine o'clock. They do not start out in the wet if they can help it. Now, it is very possible that Mr. Dixon's statement is right, that he never saw those bees there. He may have been out at high noon, but I will guarantee if he makes his observations more often, he will find the time that the bees are at work on his strawberry patch. We surely need those bees to pollenize our berry plants.

MR. SNYDER: No doubt about it.

W. H. BARNES: I did not happen to be here at the time the strawberry matter was up. If there is anything I am in earnest about, it is the strawberry. I used to pick strawberries, when I was a boy, till my back ached. I brought some strawberry plants to Kansas. These plants were unfortunate. We started from Illinois with 250 in a lunch basket. After we settled on the land our lines were changed and the plants were transplanted twice, and when we got through there were about twenty-five plants. That was in 1871. In 1873 I picked strawberries from this little patch. Not being used to handling strawberries in the market, I sold them as best I could. I got sixty-three dollars' worth off this little patch, besides feeding a large family and some of the neighbors with strawberries.

I would like to revert to a paper that was read by Mr. Wilson, on "Commercial Gardening." The tomato is a wonderful fruit. I have sold tomatoes for twelve dollars a bushel, and for twenty cents a bushel. I have raised perhaps millions of plants. People bought plants and people grew plants and lost them with the frost; you know what the conditions were, and they set out the plants again and lost them, and I saw people in my neighborhood who bought plants and who would go out nights and cover them with a paper, and tried every way to save their plants.

I want to put in a word that ought to be valuable to everybody that grows tomatoes, and that is that the tomato is often misplanted. Now, the tall and spindling plant is not to be rejected if it is planted right. Some people just plant the roots in the soil and it stands high. It suffers a great deal from the elements of one kind and another. That is not the way to plant tomatoes. I put the root the usual depth in the soil, and then put the plant down so that it is all covered except a little bit of the top. If there is danger of frost I put dirt right over them, and then go to bed and sleep in peace. Next morning, if the weather is nice, uncover them. There is one thing to be careful for: if you plant a large patch of tomatoes and lean them down lean them all one way, and then I want my hired man to be careful in hoeing on the south side of the plant. Just lay your plants down and cover them with dry earth if there is danger of frost; papers will blow off.

MR. GILMORE: I am going to disagree with Brother Barnes. He says, do not set your plants too deep. That is where he and I differ. In years past I have planted tomatoes very extensively—nothing, however, in late years; but if I were planting very tall plants, I would put them down within two inches of the top; I don't care how long the plant is. But, as he states, the entire length of the plant that is covered with dirt will send out and set roots; and it makes no difference how deep you plant them, they will root to the top of the ground.

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FINAL RESOLUTIONS.

Resolutions adopted at the forty-first annual meeting of the Kansas State Horticultural Society, held at Topeka December 26–28, 1907:

Resolved, That the chair of entomology of the University of Kansas be made an honorary member of the Kansas State Horticultural Society.

Resolved, That we select biennially a microscopist for this Society, whose duty it shall be to examine, without cost to the Society, all samples of fungi, spores or other injurious vegetative organisms sent to the secretary or to the microscopist from any part of Kansas.

Resolved, That we appreciate the attitude of Hon. E. T. Fairchild, superintendent of public instruction, on the question of "horticulture and agriculture" in our public schools, and accord him our hearty support and assistance whenever possible.

Resolved, That it is in the interest of all horticulturists, as well as other citizens, that a parcels post law be enacted, that we may be relieved of the extortions of express companies and enjoy the same privilege in this respect which all other civilized nations grant their citizens.

Resolved, That a copy of these resolutions be sent to our Congressmen and United States Senators by our secretary.

J. T. TREDWAY,
EDWIN SNYDER,
G. L. HOLSINGER,
Committee.

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MISCELLANEOUS PAPERS AND ARTICLES.

OBSERVATIONS ON THE FOOD HABITS OF THE BLUE JAY.*

By Prof. L. L. Dyche, of the University of Kansas, Lawrence.

It is not the object of this paper to give a detailed account of the food habits of the blue jay based on the examination of the stomachs. However, more than 150 stomachs have been examined, and a few notes will be given on this phase of the subject.

In 1896 Mr. F. E. L. Beal, assistant biologist, United States Department of Agriculture, made a detailed report on the examination of 292 stomachs which he had carefully studied. The material had been collected in every month of the year and from twenty-two states. At the close of his report, where Mr. Beal sums up the interesting results of his investigations, he says: "The most striking point in the study of the food of the blue jay is the discrepancy between the testimony of field observers concerning the bird's nest-robbing proclivities and the results of stomach examinations. The accusations of eating eggs and young birds are certainly not sustained, and it is futile to attempt to reconcile the conflicting statements on this point, which must be left until more accurate observations have been made. In destroying insects the jay undoubtedly does much good. Most of the predaceous beetles which it eats do not feed on other insects to any great extent. On the other hand, it destroys some grasshoppers and caterpillars, and many noxious beetles, such as scarabæids, click beetles (elaterids), weevils (curculionids), buprestids, chrysomelids, and tenebrionids. The blue jay gathers its fruit from nature's orchard and vineyard, *not from man's;* corn is the only vegetable food for which the farmer suffers any loss, and here the damage is small. In fact, the examination of nearly 300 stomachs shows that the blue jay certainly does far more good than harm."

I have examined more than half as many stomachs of the blue jay as were examined by Mr. Beal. More than half my material was collected in the city of Lawrence, and none of it more than ten miles distant. So far as stomach examinations go the results of my investigations were not very different from those of Mr. Beal. The blue jay takes a very great variety of food of both animal and vegetable kinds. The kind of food eaten depends largely upon the kind the locality furnishes during any particular season of the year. The food of July and August, as a rule, is very different from that of January and December. During the summer months the animal food, mostly insects, sometimes reached as high as sixty to seventy-five per cent. of the total food mass. This same per cent. was sometimes reached in case of fruit, especially when blackberries and mulberries were being eaten. In winter time, especially when the ground was frozen and covered with snow, vegetable matter, chiefly corn, constituted the great bulk of the jay's food.

* Reprinted from Kansas Academy of Science Transactions, 1907, Volume XXI, Part I.

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Again, the food of the jay birds in and around the city of Lawrence varies considerably from that of the jays that feed in the country districts.

The food of twenty-seven jays killed the third week in September, 1907, some nine miles southwest of Lawrence, in a wild, wooded district, was quite different from that of an equal number of birds taken during the month of September in and around the city of Lawrence. Over sixty per cent. of the mass of the food of the birds taken in the country district was made up of acorns. Only two stomachs contained even a trace of corn. The stomachs of the birds taken in the city showed over fifty per cent. of the food mass to be grain, mostly corn. The birds taken in the country district had eaten thirty per cent. insect food, and about twenty per cent. of this was made up of black ground-beetles, such predacious beetles as carabids being very common. There were also a considerable number of smooth-bodied caterpillars, the larvæ of the common humming-bird, sphinx or hawk moths not being uncommon, some of which measured as much as two and one-half inches in length. Grasshoppers, snails, snout and long-horn beetle, ants, spiders—in fact, almost any insect, even hairy worms, were occasionally found. The insect food of the birds taken in the city was not over fifteen per cent. of the food mass, dark-colored ground-beetles and grasshoppers predominating.

During the winter season the city blue jay takes almost any kind of food that comes handy, feeding in the public roads, the alleys, in back dooryards and in barn-yards. At this season of the year grain, mostly corn chop, makes up the bulk of the food mass. However, such material as cooked meats, potatoes, bread, oatmeal, rice, boiled eggs, apples and bananas are not infrequently found in their stomachs. A considerable amount of mineral matter is always found in the gizzards, such as pieces of stone, glass, various kinds of gravel, and occasionally such articles as beads, buttons and pieces of broken china.

I now desire to speak of some observations on the food habits of the blue jay, made by myself and others, not based on the examination of the contents of the stomachs. One day last winter I noticed nearly a pint of walnut hulls at the mouth of a spout that carried the water from the roof of the wash-house. At first I thought it was the work of squirrels. I soon learned that blue jays were taking pieces of walnuts that were left near some stones where the boys had been cracking them. The jays would carry the pieces of walnuts to a tree that overhung the wash-house. They would hold the pieces of walnuts on a limb with their feet and pick out the meats. We would crack nuts for them in the evening and watch them perform early next morning. They would take whole acorns, hold them the same as they did the pieces of walnuts, and pick them to pieces. They also tried whole walnuts and hickory-nuts, but failed to get them open. Walnuts are undoubtedly an unnatural food for blue jays. Yet, after they got a taste of them, they eagerly searched for the broken pieces every morning. When food is plenty the jays eat what they like best; when it is scarce they eat almost anything in the shape of food that they can find. They are fond of mulberries; I have seen them eat them many times in my own yard. I have also seen them eat blackberries, apples and green corn.

On July 21, 1907, I saw three working in a sweet-corn patch. One of these birds picked open an ear that had not been injured by other birds and began vigorously to pick at the grains of corn.

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The above observations are such as might be made by any one willing to give a little time to the study of the blue jay in his natural haunts.

There are other observations not so easily made, and more to the point of this paper, which I now desire to give. My two small boys, George and Lindsay, ages eight and twelve respectively, aided me very materially in making these observations. They were usually in the yard a great deal of the time and had many opportunities as well as a keen interest in any disturbances that might take place in bird society. Two pairs of blue jays built their nests in my yard during the past summer. The birds were very shy and very quiet about their nesting quarters, and unless one understood something of their nesting habits he would never even suspect that there was a nest anywhere in the neighborhood. My present home place has five and one-half acres in it and is partly covered with forest and fruit trees. The boys kept the English sparrows exterminated by the use of a small gun. The result was that at one time we counted as many as twenty wild native bird's nests that were being used on our own grounds.

One morning in May I saw a jay picking at something on a fence-post, and threw a stone so as to frighten the bird suddenly. When I reached the spot I found half of the shell and about one-third the contents of a turtle-dove's egg. A few mornings later I saw a jay picking at something on a dead limb of a fallen apple tree. I frightened the bird by throwing a hammer at it, which I happened to have in my hand. On the limb I found a part of the remains of a robin's egg. The very next morning, near the same spot, I saw a jay flying with something in its mouth. It lit high up in an elm tree, just over the roadway. After the jay began to pick at the object I approached and found small pieces of a speckled egg-shell which I could not determine for a certainty; by comparison it was that of a brown thrasher or cardinal redbird. In May, 1906, just a year before the above observations were made, a robin built her nest in a small tree that grew not more than ten feet from our house. The tree was beside the pump and near the kitchen door. We naturally took unusual interest in the bird, as the nest was so low that by standing on a chair placed on the sidewalk it could be touched by the hand. My boys saw nearly every movement the birds made while the nest was being constructed. Only a few days had passed when they informed me that five little blue eggs were in the nest. Immediately the old robin began her duties of incubation, and everything looked favorable for a fine brood of semi-domesticated robins right in front of our door. Quite early one morning I heard, through an open window, a great commotion among the birds out of doors. I ran to a window and saw robins and catbirds flying at a blue jay. I hurried down-stairs and was out of doors just in time to see the jay fly to a tree some distance away, the robins and catbirds still pursuing. On the sidewalk, under the little tree where the robins had their nest, was part of the shell of a robin's egg and a mangled embryo bird that had been torn out of it. I examined the robin's nest and found nothing in it except part of a broken egg-shell.

The catbirds above mentioned had their nest in a small catalpa tree about thirty yards from the house. There were four young birds in the nest. They were not disturbed at this time. A few days later, just at noon time, the boys came running to the house shouting that the jays were fighting the catbirds. We hastened to the scene of disturbance just in time to see a jay fly from a spot several yards beyond the catalpa tree. When we reached

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the place we found one of the young catbirds, nearly full grown, with its head and back so badly picked that it soon died. An examination of the nest showed only two birds remaining, which went to show that this was not the first attack that had been made on the young in the nest. A few days later, while I was at the University, the small boys saw a jay on a limb of the catalpa tree picking one of the young catbirds. Lindsay took a gun and killed the jay, a thing he had begged me to let him do on the occasion of the first robbery and murder we had witnessed in the catbird family. On my return home I examined the catbird's nest. It had but one bird left in it, and that one was so badly picked that it was dead the next morning.

June 18, 1905, Lindsay and George saw a jay bird fighting a young catbird that was large enough to fly from one bush to another. Lindsay ran after his gun and returned as soon as possible, to find, however, that the jay had the catbird killed. He shot the jay. I dissected the bird and found feathers and mulberries in its stomach.

May 19, 1907, the boys, who were playing in the yard, called to me that a jay was fighting the robins in an old apple tree near the wood-house. I hastened to the spot. The jay would not leave the tree until I threw a stone at it. I found a half-grown robin on the ground under the tree with a gash an inch long in its side and neck. George, my youngest boy, climbed the tree and put the wounded robin in the nest with its three brothers and sisters.

May 21, George brought me a young dead robin with its head picked and a hole in its side, that he found under the old apple tree. I went to the tree to examine the nest, and found that it had been robbed of all its young birds.

July 5, 1907, Lindsay saw a turtle-dove trying to fight a jay from its nest in an elm tree near our house. The jay got one of the dove's eggs and flew to a near-by fence. Most of the contents of the egg spilled out before the jay reached the fence. The boy begged me to let him take the gun and kill the jay. I told him that if we killed the jay we would not get any more observations. He said he had all the observations he wanted on jays robbing nests and killing young birds, and that what he wanted when he saw a jay was a gun.

BLUE JAYS KILL YOUNG CHICKENS.

June 18, 1905, about eight A. M., as I walked back of the barn, I saw a blue jay picking at something on a low shed roof. It was a young chicken, less than a week old. The jay flew into a near-by tree, leaving the chicken dead, with one eye picked out and the skin torn from its neck and breast. A few days before I had placed a hen and chickens under an old peach tree in a box coop fixed up with a rat-proof wire door; so I was somewhat puzzled when four or five of the chickens had disappeared. I thought of cats and rats, but the day before I caught the real thief I found the mangled body of a young chicken on the end of an old peach-tree stump. This really put me to watching the jays, as I had noticed them a number of times flying about when I went to feed the chickens. It was not an uncommon thing for the jays, in winter season, to light on the troughs where the chickens were fed and help themselves. I watched for the jays every morning but did not see them with another chicken, though all the young chickens disappeared except three. I might say that I did not try to protect the young chickens after I found that the jays were taking them. When I let the little birds out in the morning I would watch a while with the hope of seeing a jay take one, as I wanted to see how the attack was made.

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On June 23, 1906, Dr. L. B. Powell, a neighbor of mine, and an intelligent gentleman, reported to me that he had lost about a dozen young chickens, less than a week old, that had been killed by a pair of blue jays that had a nest in a tree in his yard. After he saw the blue jays kill some of the young chickens and pick their brains out, he shot the old blue jays and took the young ones from their nest and pulled their heads off.

Mr. C. D. Bunker, my assistant in the museum at the University, reported to me that the blue jays killed a number of young chickens for him two years ago. The bodies of the young chickens were more or less torn to pieces and partly eaten up. He also reported two canary birds killed by blue jays. The bird-cages were left on the porch. The jays caught the little birds and pulled them out through the space between the wires of the cage. Miss Alice Lichfield, a classmate of mine at the University, told me a number of years ago that the blue jays had killed a number of young chickens for her, but she failed to notice how the bodies had been mutilated.

Mr. Will Bullene, who lives a few blocks southeast of me, and who, from his general knowledge of birds, is abundantly able to make correct observations, told me of a neighbor of his that had lost quite a number of young chickens, due to blue jays. In this case there was a flock of about seventy-five young chickens. They were kept in a coop and allowed to run, after being fed, in quite a large runway enclosed by wire screening. A number of the little birds had been found dead in the runway, with their bodies mutilated. The owner was puzzled to make out what it was that was doing the mischief. Mr. Bullene suggested that some one be put to watch. It was not long before a jay was seen to pounce upon a chicken and pick it to death. After a few more chickens were killed, Mr. Bullene set steel traps on the fence posts where the jays were accustomed to light and caught a number of them. In this particular case the jays picked the crops of the chickens open and ate the feed, mostly corn chop.

A number of other cases have been reported to me concerning the jay's habit of robbing nests and killing young birds. I will give but one more illustration of the jay's wickedness in this line, and that came under my personal observation. It was August, 1887. A pair of house wrens had built their nest in a little cubby-hole in the corner of our porch. One afternoon, about five o'clock, while Mrs. Dyche and myself were sitting on the porch, a little wren flew down from the nest. It was a young bird, and that was the first time it had ever tried its wings. While we were admiring the little midget hopping about on the porch, a blue jay darted from somewhere and with a great flutter and commotion of its wings grabbed the little wren and flew to a fence not more than fifteen feet away. I made a few hurried steps into the house and secured a small shotgun that happened to be handy. When I returned the jay flew a rod farther along on the fence. However, it was not more than two rods away, an easy shot, and I killed the bird. Mrs. Dyche, who was watching; had meantime noticed the little wren fall by the side of the fence from the spot where the jay first lit. I picked up the little dead wren, and on examination found a small cut under one wing. There was no other cut or bruise on its body that I could find. I now picked up the blue jay. It had a little bloody heart in its beak. I dissected the wren and found that its little heart had been pulled out through the small cut that the jay had made under its wing. I dissected the jay

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and found two hearts in its stomach, quite a little larger in size than the one that had been pulled from the unfortunate little wren.

The very next evening I saw a jay dart after a little young wren, perhaps one of the same brood. My presence made it possible for the little wren to get under cover of some small bushes. The jay lit on the fence to watch. I secured my gun and shot at the jay, crippling it so it flew to a neighbor's yard and died. I was reported to the city attorney for shooting poor innocent birds.

After recording such observations I cannot help but feel somewhat like my small boy, who, after he had seen the jay with his own eyes commit a number of robberies and murders, said that "he had all the observations he wanted on jays robbing nests and killing young birds, and that what he wanted when he saw a jay was a gun."

RELATION OF BIRD LIFE TO THE HORTICULTURIST.

By RICHARD H. SULLIVAN. Read before the Sedgwick County Horticultural Society.

The constructive statesman is enobled by posterity. The destructive statesman is associated with circumlocution and finally massacre. There have been comparatively few of the former, but myriads of the latter. Until the art of horticulture is constructively considered, by large and small growers alike, the industry as an economic proposition will droop under parasitic affection.

Everything that has life must develop to fruition at the expense of some other living body. The horticulturist must pay his portion of this toll, as well as his neighboring agriculturist of the fields. Eight hundred millions of dollars annually constitute the sum exacted from the chief producers of the wealth of the country. This damage results from the ravages of the various insect and animal forms that infest vegetation. After these enemies have had their fill in their march towards a maturity that will create still further havoc during the succeeding year, the horticulturist and agriculturist can then receive the residue in the cullings.

Of course, artificial methods are employed in order to check this increasing power, but were it not for the presence and assistance of the feathered tribes, which are the scavengers of the earth, specked, knotty and wormy fruits and inferior grains would be the harvest after all of man's labor.

While he is studying out the life-histories of the various insects, it would be well to suggest that the horticulturist also study out the life-histories of the various birds that visit his locality, for without exception they are all the natural enemies to his pests. Both can occupy the same ground without much difficulty. When he looks along the gun-barrel toward the bird in his fruit-tree, let him stop and consider the millions of pounds of moths, cicadas, grasshoppers, worms, spiders, etc., in all stages of development, that are eaten or fed to clamoring nestlings and which never disturb his peace of mind. A single charge from one shell through a cherry tree will destroy more cherries than even the waxwing or cherry-bird will eat in two weeks. My father, after shooting many red-headed woodpeckers out of our cherry trees, acknowledged this, and quit the slaughter.

I have seen the mature larvæ of the Cecropia moth grow to a length of four and one-half inches, with a body as big as the butt of one's thumb, a

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size nearly one-third larger than the hawk-moth larvæ. This worm as a moth next spring will lay between 200,000 and 300,000 eggs. Who or what is to take care of them? Should it be the forester, the orchardist or the birds? The same proposition applies with like emphasis to the various beetles, ants and other moths, and the question answers itself.

Some of those present will call to mind the fact that the school-book writers of thirty or forty years ago classed practically all the region between the Mississippi river states and the Rocky Mountains as the Great American Desert. The general slope of the land from the continental divide down to the Mississippi river and thence upward to the Appalachians and the Atlantic coast, together with the normal eastward drift of the atmosphere, has for ages caused beneficent precipitation, with its consequent prolific vegetation, to the eastward, and decreased moisture, with its accompanying comparatively stunted growth, toward the rising elevations of the West. The primitive forests and brush over the wide Eastern areas were ideal homes to the feathered kingdom, giving all the wild food, both animal and vegetable, required during the summer sojourn, while the seeds of the wild grasses and weeds furnished the necessary nourishment to the winter-resident birds from the North. The almost entire absence in the prairie regions of any such general vegetation with its fruits, berries and other wild forage, as well as the accompanying insect pests, caused a very large proportion of the different species of birds to cling to the circumscribed areas occupied by their ancestors. As the western farmer began to branch out and plant trees and shrubbery, while his eastern brother was clearing out the places of refuge of these same birds, the species began to widen the extent of their explorations in migration, and thus many of the common birds of the fields, orchards and thickets drifted into this country as summer residents because they could find a living here.

Now, in this single proposition of judgment and discrimination in the planting of trees and shrubbery lies much, if not practically all, the trouble that orchardists and berry growers have had with the birds. So intent have they been in the preparation of their lands for an income, the matter of planting an occasional berry-bearing tree or bush here and there in the waste lands has been very largely lost sight of. It is a well-known fact, proven both by government tests and by actual observations of bird-lovers everywhere, that migratory birds, as a whole, very much prefer wild fruits and other wild forage to the domestic products. A little foresight in beautifying nature's landscape by planting wild cherry, buckthorn, blackgum, wild grape or other berry trees or vines would greatly decrease the depredations of all birds that are generally complained of, and also go far toward keeping fruit-eating birds out of the orchards. It would be only a matter of time until the birds themselves would propagate the growth of the different varieties through their ejections or excrement.

We feel that we are justified in the belief that any agent that directly or indirectly diminishes the natural enemies of mankind is decidedly beneficial, and that this agent in bird life as a whole is of such vast importance that the general or special grower cannot afford to be without this balance of power in his favor. If the indiscriminate slaughter continues uninterruptedly, there is no doubt in the minds of all thinking men everywhere, horticulturists and agriculturists as well as ornithologists, that the ravages of the insect and rodent pests will increase beyond control.

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There is no denying the fact, however, that at times certain classes of birds, for some unknown reason, will collect in such enormous numbers as to become a plague. This is quite frequently the case with blackbirds, bobolinks, waxwings, crows and some of the finches, and occasionally the robins. In his anger at the scourge, man's innate desire to kill causes an indiscriminate slaughter, innocent and guilty alike. I have been told that one man in this locality caused the use of over 6000 shells in one season, directed against all classes of birds.

The sight of a hawk or an owl is always followed by the grab for the gun. Yet these same raptorial birds tuck out of harm's way many millions of field and forest mice, chipmunks, gophers, rabbits and other rodent pests of the orchard. Government tests have proven beyond the shadow of a doubt that but six of the seventy-odd species of hawks and owls are harmful, measured from the standpoint of poultry. And even this weakness of the six species is vastly more than offset by the field vermin consumed, which includes the mice that ruin thousands of fruit-trees by rimming them near the roots. Oftentimes the hawk that swoops to the thirty-cent hen is sacrificed, and the fifty-dollar fruit-tree is allowed to be ruined by the rodents this rapacious bird had fed upon. Another point that is well worth consideration is that where hawks, owls and snakes have been thinned out, by the gun or other processes, the rodent ravages have soon vastly multiplied. The hawk and the owl in the orchard serve the same purpose as the cat in the barn.

Of the birds generally recognized as insectivorous, I have selected a few specimens that are most abundant as summer residents.

The catbird, belonging to the thrush family, is killed in many localities as one would a gopher or a snake. This bird eats twice as much wild fruit as domestic. Meantime he will feed upon May beetles and their kindred; his diet also consists largely of snout beetles or weevils, which include the plum-curculio, leaf-eating, darkling, click, longicorn, blister and firefly beetles. The proportion of animal to vegetable and miscellaneous matter is 44 per cent., and the domestic fruit eaten is 18 per cent.

The large brown thrasher, one of our commonest birds that frequent the low trees and brush along the waterways, possesses many habits similar to the catbird, but will eat 63 per cent. of animal food during the year and only 8 per cent. of domestic fruits.

The common American robin, one of the birds most admired generally throughout the country, and also one of the first harbingers of spring, is quite frequently killed as a common thief. An article prepared by Mr. William Dutcher, president of the National Association of Audubon Societies, gives the following results from tests of 330 robin stomachs: Annual food: Insects, per cent., 44; wild fruit, 43; domestic fruit, 8; miscellaneous, 5. May: Insects, per cent., 84; wild fruit, —; domestic fruit —; miscellaneous, 16. June: Insects, per cent., 51; wild fruit, 19; domestic fruit, 29; miscellaneous, 1. July: Insects, per cent., 42; wild fruit, 26; domestic fruit, 30; miscellaneous, 2. August: Insects, per cent., 49; wild fruit, 49; domestic fruit, ½; miscellaneous, 2. Government tests of 500 robin stomachs have shown 8 per cent. domestic fruit for the year, and 42 per cent. of wild fruits, of which forty-two varieties have been identified.

Anybody at all observant can identify the sprightly little house wren by its song, which continues from its arrival, about the first of May, until mid-

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summer. This bird is 99 per cent. insectivorous. Mr. Henry Oldys, assistant biologist, in the Year Book, 1902, states that Mr. Robert Kennicott ascertained that a single pair of wrens carried to their young 1000 insects in a day; at this rate the brood destroyed 10,000 insects before leaving the nest. The writer once observed a female widowed wren make twenty-eight trips to four young in a box during a single evening hour.

House martins and all of the swallow families are 100 per cent. insectivorous.

Prof. F. E. L. Beal, of the Department of Agriculture, has determined that 76 per cent. of the bluebird's food "consists of insects and their allies, while the other 24 per cent. is made up of various vegetable substances, found mostly in stomachs in winter. Beetles constitute 28 per cent. of the whole food; grasshoppers, 22 per cent.; caterpillars, 1 per cent. The destruction of grasshoppers is very noticeable in the months of August and September, when these insects form more than 60 per cent. of the diet."

The Cardinal grosbeak, or redbird, and the Rose-breasted grosbeak, according to Mr. Dutcher, and also the writer's observations, have similar general habits. The former consumes immense numbers of beetles, grasshoppers, crickets, flies, ants, and rose-bugs. The latter is the main species of the few which relish the Colorado potato-beetles, and this habit has made it a noted bird, although it has been known to damage peas. It is the opinion of all observers that this bird should receive the full measure of protection on account of its fondness for the yellow-striped beetle. Both species also feed upon wild fruits and berries and the seeds of weeds and grasses, especially in winter.

The various flickers are the ant eaters of the country, and can be found in any orchard of the middle latitudes during the mild or even moderately severe winters. The remainder of their food consists of miscellaneous insects and vegetable matter. Proportion of food, fifty-three per cent. of ants and forty-four per cent. miscellaneous. This is the woodpecker that spends much of its time on the ground. Three flicker stomachs examined by the experts contained 8000 ants. This bird is badly treated by the farmers, when it should be given all possible protection.

The blue jay is essentially a woods bird, but large numbers of them visit this locality during the summer and disappear completely during the winter, although the writer has seen them all winter in the Ohio valley. According to Mr. Dutcher, three-fourths of his food consists of vegetable matter, of which 43 per cent. is mast, such as acorns, beechnuts, etc. Insects are eaten every month of the year, the average being 23 per cent.; but in August this is raised to 66 per cent. It is a noteworthy fact that when the farmers' products are in condition to eat, this bird prefers the wild forage. Government tests of hundreds of stomachs have shown a very large percentage in favor of the blue jay, although its pugnacious habits are reprehensible. Its so-called egg-eating and bird-killing propensities are very largely born of imagination or isolated instances.

Beetles, grasshoppers, cicadas, bugs, ants, wasps, flies, caterpillars, and spiders, according to the tests of Professor Beal, constitute more than three-fourths of the diet of the cuckoo. Half of its food is composed of tent-caterpillars. "The common tent-caterpillar formerly fed on the wild cherry, but has now turned its attention principally to apple trees, sometimes com-

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pletely defoliating them." Too much protection can never be given this quiet bird, which can be recognized as the raincrow, so-called, by its cry.

The Baltimore oriole has been charged with eating fruit and damaging grapes. Persons familiar with the habits of this species know it to be mainly insectivorous. Its food, according to the government tests, consists of 83 per cent. animal and 17 per cent. vegetable matter. The largest amount of insect food was 92 per cent. in May, falling to 70 per cent. in April and July. Caterpillars formed 34 per cent. of the animal matter. In May, June and July click-beetles form 9 per cent. of its food, and beetles generally constitute the major portion of animal matter next to caterpillars. The May beetles stand next to click-beetles as a relish for orioles. Leaf-beetles, among them the striped squash-beetle, are eaten by orioles, although they are often shunned by other birds on account of the disagreeable excretion. Myriads of plant-lice, scale-lice, bugs and flies are commonly eaten. Many stink bugs are among the number; these bugs give the extremely objectionable flavor that is so often found on different berries, especially raspberries. While the tests show that domestic fruits form a portion of its diet during the summer, it is the general opinion of observers and experts that its beneficial qualities vastly outweigh its liking for fruit. In Colorado this bird is represented by its cousin, the Bullock oriole, one of the most numerous summer residents there. In the Grand valley, where they produce berries, cherries, grapes, plums, peaches and apples by the car-load, I have never heard a single complaint of this fruit-eating weakness, and I must confess I was astonished when I found that the Baltimore oriole was blacklisted in this country. During the past several years robins, jays, catbirds, thrashers, bluebirds, flickers and English sparrows have been much more numerous, and it is difficult to understand why the oriole is singled out for destruction when one familiar with the habits of the different species comes to consider the matter.

Government tests of upwards of 30,000 stomachs of birds that affect the farm, garden, orchard and forest have shown but a very small percentage of harmful birds. Observations of thousands of bird fanciers in the rural districts, as well as the government tests, bear testimony beyond contradiction that nestlings are fed on animal matter, the composition of the food merging into the mixed diets of the adults as the young become stronger.

Space and time forbid more than reference to the families of warblers, vireos, smaller woodpeckers, nuthatches, flycatchers and titmice that search the orchards for insects and their larvæ; nor the large family of sparrows that consume millions of pounds of weed seed every winter, except the English sparrow. This bird demands more toll of the horticulturist than any two of the preceding birds combined, and prefers the offal of the street or country road to the general diet of wild sparrows. It drives out far better scavengers than itself, and is really the worst pest that has ever afflicted this country.

To borrow linguistic force from our lamented friend, Scipio Africanus, "The English sparrow above all other birds, and not the oriole, must be destroyed!"

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SMALL FRUITS.

By J. C. BANTA, before the Shawnee County Horticultural Society.

One man plants certain varieties of small fruits on such land as he may have under supervision, and cultivates according to his individual notions, while his neighbor selects somewhat different varieties, plants on slightly different soil, and cultivates in a manner peculiar to himself. Now it is very evident that these men, although located in the same section of the country, and working under exactly the same climatic conditions, will not look at fruit growing with the same eyes or at the same angle. However, we must learn from the experience of others, and I know of no better way to get a line on this subject than to give in the main a partial review of my own experience, knowing at the same time that it will not exactly agree with the experience of others.

Years ago, when I was younger than I am now, my notion was that no other vocation was equal to that of a fruit grower. Picking berries was work that I always enjoyed from boyhood up, and when it came to eating them I still made a full hand. I always enjoyed a visit to a fine berry field when it was in full bloom, or when laden with the ripe fruit.

About twenty-three years ago we purchased a small farm west of Lawrence, in Douglas county. This farm had a fair apple and cherry orchard and some small fruit. We set out another apple orchard of 2000 trees, and between these trees we set raspberries. The most common varieties at that time were Souhegan, Gregg, and Mammoth Cluster. The next season we had planted forty acres of raspberries, and the following year increased to fifty acres. We also planted twenty acres of blackberries and ten or twelve acres of strawberries. The best-known varieties of blackberries at that time were the Kittatinny and Lawton. For strawberries we set Crescent, Downing, Windsor Chief, Captain Jack, and Miner's Prolific for the main fruit crop, and twenty other varieties for plants, as the sale of plants often brings about as much revenue as the berries. We were now strictly in the small-fruit business, and experience was coming thick and fast.

The first season we employed two berry-pickers, the second season about forty, and the third year over a hundred. We found that as a rule women and girls make the best pickers because they are apt to handle the berries more carefully than men or boys. We built good, strong, well-ventilated sheds at convenient points in the field to furnish shelter for the berries, and also for the pickers in case of a rainstorm. I have often seen crates of berries sitting in the broiling sun for hours where parties thought it would not pay to erect sheds to shelter them, and as a result the berries were very soft, would drop very low in the boxes, and would not keep in saleable condition more than half as long as they should. Remember that berries carefully picked, carefully crated and handled, are half sold. Even when the markets are overloaded, the choice crates still find a purchaser.

The first berries, both blackberries and raspberries, that we offered on the Lawrence market were sold at four dollars per crate. Such a price as that would naturally encourage any fruit grower, but these prices did not last very long. When we came to market with only a half-dozen crates the grocers would meet us in the middle of the street, glad to see us and anxious to take a peep at the berries. We could command so much attention that

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we actually felt proud. Everybody wanted our berries, and they would pay a big price to get them. How was it about two years later, when we appeared on the market three or four times per day with from thirty to forty crates on each load? Where was the grocer that used to greet us with a halo of bright smiles? Did he run out bareheaded into the street swinging his arms to have us stop opposite his place of business? Not on your life! He might be in the cellar sorting potatoes, he might have just stepped up to the bank to deposit his surplus cash, or he might just possibly have hidden himself in an empty goods-box to avoid those pesky berry growers. At any rate, it seems that when you have a big load, and the market is overloaded, the customer is extremely hard to find. How easy it is for every experienced fruit grower to recall a circumstance of this kind. Suppose that by accident you find your grocer at his usual place of business, the chances are five to one that he does not see you for fifteen or twenty minutes. He rushes to the front to sell some girl two cents' worth of chewing-gum, and then back to draw a pint of kerosene for some tow-head, while with that big load of perishable fruit you patiently await his pleasure. Finally he has waited upon all customers in sight and then informs you that berries are selling very slowly and that he does not wish any more at present. It is enough to say that our home market at Lawrence was soon overloaded, and we must either sell to shippers or send them broadcast on our own responsibility. The local canning factory east of town tried to help out to some extent, but when they could pay us only three or four cents per pound for strawberries and blackberries, and four or five cents per pound for raspberries, we very soon concluded that it was slow business. They argued that they must have them as these prices in order to compete with canning factories in the East; and I have no doubt but that they stated only facts, because some sections can grow berries cheaper than we can.

Our first shipments of berries were sent to Topeka, and when that market began to show weakness, we sent them to Manhattan, Junction City, Abilene, Emporia, Newton, Hutchinson, Dodge City, and a score of other smaller towns. We also sent large express loads to Lincoln, Omaha, Denver, Colorado Springs, and Trinidad.

One of the chief drawbacks connected with this shipping business that I will mention is the rough manner in which the berries were handled by the local expressmen. When we had large loads and everybody was in a hurry these men would toss the crates from the trucks to the car something like the workmen toss bricks from a loaded wagon. If a crate should alight unside down on the car floor or get part of a lid knocked off, or side staved in, it was considered a matter of little or no importance. What was a crate or two of berries, anyhow? This rough handling of the fruit finally led to a bitter feeling between expressmen and berry growers. The result was that the leading berry growers were forced to superintend the loading of their own fruit on the car. However, this did not protect us at the other end of the haul. I sent a young man to Hutchinson, Kan., and a younger brother of mine went to Colorado Springs. They met every train that carried berries and personally assisted in unloading them, and so successful were we in handling berries during that season that not a single crate was lost or reported damaged. The fact is that when expressmen have only a few crates of berries to handle they may do the work with reasonable care, but just so soon as they consider that they are somewhat overloaded they get reckless

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and the profits of the berry grower go glimmering. Our experience has shown conclusively that much of the damage reported is due to rough handling.

If you wish to ship berries successfully, know your man at the other end of the line, and if shipped in large quantities, he should meet the train every time and see that they are unloaded with care, while you can see to it personally that they are started in good shape.

Here at Topeka an organization has been effected for the purpose of shipping the surplus fruit to other markets, and there is no doubt but that an organization will command far more respect than single individual shippers. Consequently, if we ship in this way at all, it will certainly be much better to ship through the organization than as individuals. In the first place, a complaint to those in authority from an organization will receive attention much quicker than from a single shipper. Second, an organization will be able to distribute the shipments to advantage, while if left to the separate individual shippers some favorite market will be overloaded. Third, the berry growers have neither the time nor the opportunity to attend to these shipments and keep posted on the prices at other markets. Fourth, while many single shippers are working independently of each other it is much harder to maintain a uniform price on fruit than when shipped and sold by the organization. Consequently, if we ship at all it must be through an organization or association.

We must not fail to give some attention to another part of this subject. I will say from experience that ground intended for small fruit should be fall-plowed and left without harrowing until spring; then use a drag-harrow, after this a disk-harrow, then a drag-harrow again, till the land is very mellow.

Raspberry, blackberry and dewberry plants are usually set about three by seven feet. Blackberry plants are set in best shape with a spade, while raspberry and dewberry plants are best in a furrow and covered by hand. Few men set blackberry plants deep enough, while the opposite is true with raspberry and dewberry. Strawberry plants are usually set about eighteen inches apart in rows which have been marked about wide enough for corn. Some use spade or trowel, others use no tools whatever, but do the work entirely with the hands. I like a light spade best.

Strawberry plants should always be dug from beds that were well cultivated the previous year. Never take plants from extremely rich land and set them in a poor soil, but it works all right to take plants from poor soil and put in where the land is rich. Set good plants or none. Thousands of dollars are lost annually by setting poor plants. I do not mean by this that you should try to get hold of those known as pedigreed plants, because there is no such thing as a pedigreed plant.

The so-called pedigreed plants have been tested at our best Experiment Stations alongside the same varieties from common beds, and they have failed to show any grounds for claim of superiority. I have often seen these so-called pedigreed plants growing in the same fields with other plants and enjoying the same cultivation but showing no better results. I know of parties in the state of Michigan that advertise extensively and ship these wonderful pedigreed plants to all parts of the United States. These men will sell you new varieties of strawberry plants that they themselves purchased of the originator only the year before. So that in only one season of

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good cultivation they become pedigreed plants. Why not purchase a scrub calf, colt, or pig, feed it a year, or until it gets fat, and sell it for a thoroughbred? However, this bait was only intended for suckers, and it worked in fine shape for several years.

After setting any kind of berry plants the sooner they can have a light cultivation the better, and certainly no weeds of any kind should be allowed to grow among the plants during the first season.

Many fruit growers contend that a blackberry patch should not be cultivated after August 1 or 15 in order that all wood may be well ripened for winter, but my experience has been that when cultivated until November 1, or until most of the leaves have fallen, they will be more vigorous and never winter-kill. The Early Harvest blackberry is quite tender to cold, but I have never seen them injured when the cultivation was kept up until November 1. This fall cultivation should be very shallow. We use a light drag that has a double row of large nails driven in the bottom, which stirs the earth thoroughly to the depth of one or two inches and is wide enough to clean out the entire space between the rows.

In the berry business, as in other vocations, a man is apt to have a hobby. One man thinks there is a fortune in the Warfield strawberry, and holds to it year after year. Another takes the Cumberland raspberry for a leader. Another says the Kittatinny blackberry is all he wishes in the fruit line. And another says there is more money in cherries than any of them. I have taken a fancy to the Lucretia dewberry, and have at the present time about thirty acres planted to this variety, but will not feel quite satisfied until I get at least ten acres more. I wish to try forty acres of dewberries for a while. They are good shippers and sell for good prices everywhere. I give clean cultivation the first season and the early part of the second year, after which I let them shift for themselves. When they get too thick I put four horses to a disk harrow and thin them out. I cut tall weeds with a mowing-machine by raising the bar as high as possible, while short weeds can do no damage among dewberries.

Not every farmer wishes to be a fruit grower, but all farmers should plant enough in their own gardens to furnish a liberal supply for their own families, not only fresh during berry season, but sufficient for canning purposes. I have observed that where people pay cash for all their fruit the supply is generally limited.

In conclusion, I will say that the season of 1907 will long be remembered by the fruit growers. We will go to market with a very small load, only a few crates. It will not be necessary to make more than one trip each day, and one small horse can easily draw the load. And when we get to town will we need to beg some overloaded grocer to accept a few crates at his own price? No; he will tell you that he has already sold, or at least promised, his customers five or ten crates immediately, and must have them, or have trouble. You have only to keep quiet and the market price will advance while you wait.

I am satisfied that fruit is a more healthful diet than meat, and I always have advised people to eat fruit, and then eat more fruit; but for the season of 1907 you should eat very little fruit, because you cannot get it.

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FEEDING THE ORCHARD.

By H. J. WATERS, Dean of the College of Agriculture and Director of the Missouri Experiment Station.

Information on orchard fertilization gained from accurate experimental work, or based upon long-conducted observations, is almost entirely lacking. Moreover this phase of plant feeding presents many very intricate and difficult problems. An orchard means a large outlay of money, labor, and time. If by improper or incorrect fertilization a late or soft growth be induced, the dangers of winter-killing are largely increased and probabilities of serious attacks of fungous diseases are greater; and if this process be continued long enough and these dangers even be eliminated, the time of coming into fruit is very much deferred, and the tree is made so large as to increase materially the expense of spraying and harvesting.

In these respects mistakes in orchard management, and especially in orchard feeding, are particularly costly and disastrous, and have no parallel in the management and fertilization of other agricultural plants. A mistake, for example, in the fertilization of a corn crop is limited in its unfavorable results to the season in which the mistake is made, and under ordinary circumstances involves only a loss of the money paid for the fertilizer—the fertilizer at the most failing to produce any gain. It is possible, however, for a mistake in the fertilization of a pear orchard, for example, to result in the total destruction of that orchard by blight, or the limiting of the usefulness of the trees for many years to come.

On the other hand, there are somewhere and at some time forces at work which determine whether a bud shall result in the growth of leaf, stalk and stem or shall produce fruit. Without doubt, the kind and amount of available plant food in a soil during the previous season, together with the physical condition of the soil, taken in connection with the treatment of the land from the opening of spring until the latter part of June, exert a large influence upon the question as to whether a tree will set fruit buds for the following year or produce only growth buds. So far as we know, at some time between the starting of growth in the early spring and the practical limit of length of growth in the latter part of June or early in July, for the latitude of central Missouri, this differentiation between fruit-buds and growth buds occurs. Part of the influences affecting this differentiation are unquestionably climatic, and are, therefore, practically beyond our control. Apparently, however, the chief factors affecting this result are within our control, if we knew just what combination of conditions to make.

Theoretically, it would seem to be possible to take a soil very deficient in plant food but having a proper physical condition, and by supplying the plant food artificially, and therefore in the proper proportions, so as to hasten or retard growth as it might be found necessary, and, barring seasons when the fruit is killed by the weather, insure full fruiting every year.

The farmer in the arid region finds it more convenient and profitable in irrigating to supply all the water that the crops require so as to be able to control conditions, rather than to have his plans entirely upset by an unexpected rain. For this reason, irrigation in this humid climate is fraught with many difficulties and uncertainties, just as is the feeding of fruit-trees on a soil that itself supplies a goodly amount of plant food, but an amount that varies from season to season. Moreover the trees vary greatly in the amount of plant food required in different seasons. For example, in a very

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unfavorable season for growth, on account of dry weather, if the orchard be barren of fruit the amount of plant food taken would be very small in comparison with the amount used in full fruiting and when a good growth is made.

It should be remembered, however, that the principal amount of plant food used by the tree is for the production of fruit and leaves, the amount stored up in the tree in the form of wood being comparatively small.

THE EFFECT OF FERTILITY UPON THE LIFE OF THE TREE.

Two conditions affect the life of a tree, and especially the productive life. One is the physical condition of the soil upon which it grows, and the other is the amount of plant food supplied, either naturally by the soil or artificially by the orchardist.

It is a matter of common observation that fruit-trees on thin soils come into bearing early, exhibit a strong tendency toward fruitfulness for a comparatively short time, and die; and that trees on good, strong land come into bearing as a rule somewhat later, grow to much greater size, and live for a very much greater number of years. It is safe to say that well-fed trees may have more than double the number of productive years than those which are underfed usually have. This is strikingly shown by the results of an experiment conducted by the New Jersey Experiment Station with peaches, in which it was observed that on the unmanured land the crops secured at end of eight years were so small as to very materially reduce the average for the whole productive period, while in the case of the manured land the average for the entire period was not only not reduced, but very materially increased. Thus the crops secured from the manured trees, after those receiving no manure had practically ceased to bear, were greater proportionately than those secured previous to that time. This is to say, that the properly fed trees were at the very height of productiveness at the time when the unmanured trees had practically ceased to bear.

In the case of an orchard that ceases to be productive at the expiration of a twenty-year period, almost half of this period was practically unproductive and was little else than a dead expense, namely, the first ten years and before the trees had come into bearing; whereas, if by more judicious handling and better feeding the productiveness of this orchard may be extended to thirty years, less than one-third of the total expense is for getting the tree up to the point of bearing, and two-thirds of the tree's life is productive.

Above all is it important to have a uniform supply of available food for the orchard. Fat years alternating with lean years are very much more to be avoided than either poverty or riches as a steady diet. All radical changes in the soil condition, either with respect to the supply of plant food or the physical characteristics, should be carefully avoided. Practically all of the bad effects of overfeeding have come from the sudden change from extreme poverty to a surplus of food. It is a matter of common observation that trees in a poultry yard, where the land is manured heavily every year or lies near a dry-earth closet, or adjoining a barn-yard, when the supply of available plant food is excessive but regular, produce enormous crops and live to good ages.

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THE SOIL.

So much has been said about the type of soil best suited to fruit that little need here be added. Naturally, the soil upon which the orchard is being grown will have much to do with the methods of fertilization and general cropping and cultivation. So also will the previous treatment of this land have an important bearing upon these matters.

If we could determine accurately the amount of available plant food in a soil and the amount that would be rendered available each year, and then know the amount required by the crops grown on the land, it would be an easy matter to strike a balance and determine exactly what amounts and kinds of food it would be necessary to supply artificially to produce a normal crop. While we are able to say with a fair degree of accuracy what amounts are required by the growing and bearing trees per year, we do not yet know, and, unfortunately, cannot yet determine how much of this the soil may be relied upon to supply. It is comparatively easy to determine the aggregate amount of plant food in a given soil, but to say how much of this an apple tree or a crop of corn or wheat will be able to take out or utilize this year or next year is a totally different matter, and, unfortunately, the agricultural chemist has not yet been able even to approximate the solution of this important matter.

AMOUNT OF PLANT FOOD IN A SOIL.

To illustrate this point, the following tables show the total amount of the more important elements of plant food contained in an acre of three types of Missouri soils—one a good corn and wheat land, capable in favorable seasons of producing 60 to 70 bushels of corn and 30 to 35 bushels of wheat; another a red limestone clay, which has been considered a fine fruit soil; and a third a pine-ridge clay that is considered to be practically unproductive:

PLANT FOOD PER ACRE IN THE SURFACE SOIL TO DEPTH OF SEVEN INCHES.

KIND OF SOIL.	Nitrogen, lbs.	Potash, lbs.	Phos. acid, lbs.	Lime, lbs.	Magnesia, lbs.
Clay limestone, College farm	4,840	60,621	2,541	21,054	13,794
Red limestone clay, Wayne county	2,575	8,325	700	11,925	11,450
Pine ridge, Shannon county	2,050	5,350	325	4,325	7,900

SUBSOIL, TO DEPTH OF THIRTY INCHES.

KIND OF SOIL.	Nitrogen, lbs.	Potash, lbs.	Phos. acid, lbs.	Lime, lbs.	Magnesia, lbs.
Corn land, College Farm, Boone county	8,150	208,785	9,317	66,066	44,467
Red soil, Patterson Basin, Wayne county	8,225	53,375	3,062	50,137	87,892
Pine ridge, Shannon county	3,412	33,162	1,137	Trace	44,662

There is a striking difference in the quantities of these elements of plant food contained in these soils, and particularly between the so-called corn land and the pine ridge. At the same time, there is sufficient plant food within the first seven inches of this pine ridge to produce fifteen crops of apples of 500 bushels per acre, besides furnishing the material necessary to grow the trees. In other words, while there is sufficient plant food in even the poorest of these soils to make a man rich in the orchard business if he could only get it out, the difficulty is that it is so locked up and is rendered

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available so very slowly that the orchardist would be unable to wait for his trees to grow or bear.

Clearly the clay soil of the College farm, judged by its content of plant food, is far superior to any of the others. We might safely conclude from this table that the soil would be the best of the three for general agricultural purposes, but experience has abundantly demonstrated that this is poor orchard land on account of its very close texture and because it is not well aerated beyond the first few inches of the surface.

The practical orchardist would choose the red soil, because it has been found that soils of this color, generally speaking, have proven to be good orchard lands, *i. e.*, trees on such soils make a good growth, reach an old age, and are uniformly fruitful. So far as we know, this was not due, as was formerly supposed, to the presence of this red oxid of iron, this iron simply indicating that the soil is open and porous, and furthermore that it is not a leached soil.

Sufficient red oxid of iron to make the soil highly colored, then, shows conclusively that the soil is well aerated and that the plant food is likely to be in a readily available form.

A red subsoil is of special importance to the orchardist, because it indicates that the soil has been aerated to a good depth, enabling the roots of the trees to reach a normal development at a good depth, so as to be protected against the excessive heat of summer, the variations in moisture content, and the fluctuations of the seasons.

The red oxid of iron furthermore indicates that the soil has not been leached. A gray or a light-brown soil may have quite as good a physical texture as the best of the red soils and yet be in general unsuited to orchard purposes, for the reason that the plant food originally contained in this soil has been leached out and lost. The red color, therefore, indicates a soil of good physical condition to a good depth, with plant food still present in reasonable quantities and in a fairly available form. These constitute the essential characteristics of a good fruit soil.

It is believed that a soil of moderate fertility, but of such structure as to insure the presence at all times of a moderate supply of available plant food, will prove to be, all things considered, the best fruit soil. Here the trees will make a regular, uniform, healthy growth, will be fruitful, and will ripen their wood properly to withstand the rigors of winter.

If this be true, then we have an important suggestion in the handling of soils that for one reason or another do not furnish precisely these conditions. In one case the soil may be naturally somewhat poor, but have the proper physical condition, wherefore we can supply the food in a slowly available form, and in this form the plant food is relatively cheap, so that we may be able to make liberal applications.

In another case the land may be rich enough but of such close texture that disintegration goes on slowly and the trees cannot root. Here the correction of the physical condition will furnish the remedy cheaper than an application of available plant food. If the land be a clay, a copious dressing of lime, say 2000 pounds per acre, will do much to remedy the defect.

If perchance the soil be too open and porous, as in the case of a sandy soil, so that the organic matter burns out readily, and the soil dries to a great depth in midsummer, to the detriment of the trees, an application of

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lime will correct this evil, and make the soil more compact and more drought-resistant.

RED SOILS OXIDIZE ORGANIC MATTER READILY.

While red soils are known to be good fruit soils, it should be remembered that they oxidize or burn out their supply of humus or organic matter very rapidly, because this organic matter is exposed to the air, just as it is in the sandy soil, and is therefore quickly oxidized; therefore manure applied to a red or a sandy soil will show greater results in the first year or two than on a tight, close clay, but the benefits will not be nearly so lasting. The same is true of a crop of green manure. Such types of soils as these therefore become deficient in humus much quicker than what we commonly term slower and tighter clay lands.

It is furthermore true, in the case of red soils, that in the change from a moist to a dry condition of the soil there are important chemical changes in the iron itself which greatly facilitate the burning out of the organic matter. This is due to the fact that the red oxid of iron in contact with organic matter and in the presence of moisture is reduced to a suboxid, giving off by this process a portion of its oxygen to burn the organic matter present in the soil. In the drying of the soil the suboxid of iron is quickly raised to the higher form of the red oxid, ready to give up again, in the presence of moisture, its oxygen to burn out the vegetable matter. This process of oxidizing organic matter continues as the land alternates between wet and dry conditions. It is of the utmost importance, therefore, that the owners of red land should be especially careful to maintain a liberal supply of humus under all circumstances, and to calculate upon this extra loss due to the presence of iron.

FOOD REQUIREMENTS OF DIFFERENT CLASSES OF FRUIT-TREES IN BEARING.

While the different kinds of fruit-trees present important differences in their habits of growth and productiveness, yet in the proportions of the different elements of food required for their normal growth and fruitfulness they exhibit a striking similarity, as is shown by some recent investigations conducted at the New York Experiment Station.

RELATIVE PROPORTIONS OF PLANT-FOOD CONSTITUENTS USED BY BEARING TREES.

VARIETY.	Nitrogen, lbs.	Phos. acid (P_2O_5), lbs.	Potash (K_2O), lbs.	Lime (CaO), lbs.	Magnesia (MgO), lbs.
Apple	1	0.27	1.07	1.10	0.45
Peach	1	0.25	0.97	1.53	0.47
Pear	1	0.24	1.10	1.30	0.37
Plum	1	0.29	1.29	1.40	0.52
Quince	1	0.33	1.25	1.44	0.42
Average of all	1	0.27	1.14	1.35	0.45

It will be noted that these proportions apply to the food requirements for trees in full bearing, and represent the food necessary not only for the development of the fruit, but of the leaf and twig growth. It will be observed that there is very little difference between the different kinds, all requiring plant food in quite similar amounts.

This means, of course, that as far as the chemical composition of a fer-

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tilizer is concerned, it would be quite as well adapted to one fruit as to another.

AMOUNT OF PLANT FOOD REMOVED PER ACRE BY BEARING TREES.

It is impossible to supply data on this point applicable to all classes of trees and to all seasons. In other words, it would be exceedingly difficult to find a number that would apply to the average season and soil. When it is realized that of the total plant food required to nourish a tree during the season, including the wood growth, the crop of leaves, and the crop of fruit when the tree is in full bearing, some 79 per cent. of the dry matter formed by the tree is in the fruit pulp, in the case of the apple, about 19 per cent. in the leaves, and 2 per cent. in the new growth, and that in general the fruit requires about half of all the plant food used by the tree during the growing season, it is obvious that the size of the fruit crop will affect very materially the amount of plant food used.

On the other hand, during a season when a tree is bearing a heavy fruit crop, there is, as is well known, a comparatively small amount of new wood formed, and the requirements of plant food for this purpose are in such a season very small indeed. Yet in seasons of crop failure, or when very little fruit is borne, there is a relatively large wood growth, except when it is too dry, so that the tree draws more heavily upon the soil for this particular purpose in such a year than when it is carrying a full load of fruit.

Moreover, in seasons of extensive wood growth the leaf growth is also larger than when the tree is carrying fruit, and for the development of the leaf crop there is required about the same amount of plant food as for the normal fruit crop. In fact, to produce the leaves requires nearly double the amount of nitrogen that is used by the fruit, and ten times as much lime, although only about half as much potash and phosphoric acid.

The New York Experiment Station has in a recent bulletin given us some very interesting and valuable data on this point that will serve as a general guide, and are fully set forth in the following table:

AMOUNTS OF PLANT FOOD USED PER ACRE.

VARIETY.	Number of trees per acre.	Nitrogen, lbs.	Phos. acid (P_2O_5), lbs.	Potash (K_2O), lbs.	Lime (CaO), lbs.	Magnesia (MgO), lbs.
Apple	35	51.5	14.0	55.0	57.0	23.0
Peach	120	74.5	18.0	72.0	114.0	35.0
Pear	120	29.5	7.0	33.0	38.0	11.0
Plum	120	29.5	8.5	38.0	41.0	13.0

The plant food in the above table represents that required for the building of all the new wood growth, for what was deemed to be a normal fruit crop, and for the leaves from representative trees in the full vigor of bearing.

"The fruit, leaves, and the new wood, as represented by the tips of the branches, were carefully gathered, weighed, dried and analyzed. Precautions were taken when necessary to avoid the loss of foliage by enclosing the entire tree in mosquito-netting. A record was kept of the fruit that fell before the final picking. The fruit was picked at the stage of ripeness usual in common practice. The foliage was left until it showed a tendency to drop. The twigs of new wood were removed soon afterwards."

It will be noted that in the above estimate only thirty-five apple trees

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are computed per acre, while it is customary in Missouri to set seventy. The amounts of plant food used per acre should not, however, be doubled to make the data apply to our conditions, for the reason that these were larger trees than we grow and perhaps as fully occupied the ground as our seventy trees would under normal conditions. This being true, it is likely that as much plant food was required as would be needed for an acre of trees planted in our way, and, in my judgment, the figures as given are high enough for our conditions. The number of trees grown per acre of the other sorts is essentially the same as grown by us.

It will be observed that the peach requires a larger amount of plant food per acre than any of the other classes of fruit, with the apple second, and then a large decline occurs to the pear and the plum, which did not differ materially.

It is of further interest to note that the amounts of nitrogen and potash used by a given kind of fruit-tree are essentially the same, *i. e.*, the tree requires these two elements of plant food in about the same amounts. The trees require only about one-fourth as many pounds of phosphoric acid as of nitrogen or of potash. "In most commercial fertilizers recommended for fruit-trees, phosphoric acid is present in proportions about four times the nitrogen. This is doubtless on the assumption that the soil contains more nitrogen relatively than phosphoric acid, which may or may not be true in individual cases. The question may be raised as to whether quantities of phosphoric acid are not frequently applied much in excess of the actual need of a season's crop."

AMOUNTS OF PLANT FOOD USED PER ACRE BY DIFFERENT PARTS OF THE TREE.

Referring again to the use to which the tree puts the plant food, as shown in the previous table, it will be of interest to observe the following data:

AMOUNTS OF PLANT FOOD USED PER ACRE BY THE DIFFERENT PRODUCTS OF THE TREE.

Part of Tree.	Kind of fruit-tree.	Nitrogen, lbs.	Phos. acid (P_2O_5), lbs.	Potash (K_2O), lbs.	Lime (CaO), lbs.	Magnesia (MgO), lbs.
Fruit	Apple	20.0	8.5	45.0	3.9	6.4
"	Peach	17.5	8.6	36.0	2.2	4.1
"	Pear	9.0	3.2	20.2	2.2	2.6
"	Plum	13.3	4.7	18.5	4.4	3.0
Leaves	Apple	30.3	4.8	9.5	49.7	16.3
"	Peach	50.4	8.0	32.9	94.6	28.5
"	Pear	18.5	3.0	10.7	30.7	7.2
"	Plum	13.2	2.9	17.6	26.8	8.5
New wood	Apple	1.1	0.4	0.6	3.0	0.6
"	Peach	6.6	1.6	3.4	17.4	2.6
"	Pear	2.2	0.8	2.0	5.4	1.1
"	Plum	3.0	1.0	1.8	10.0	1.5

In respect to the amounts of plant food used per acre by the fruit of the different varieties of trees, the amounts of nitrogen, phosphoric acid and potash in the different fruits are in about the following order: Apples, peaches, plums and pears.

Potash is present in the fruit in larger quantities than is any other plant-food constituent, nitrogen coming second and being present to the extent, approximately, of one-half the amount of potash. Then follow, in order,

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phosphoric acid, magnesia and lime, all of these being present in much smaller amounts.

In the leaves the plant-food constituents used per acre are greatest in the case of the peach, the apple coming second, then the pear and plum.

Lime is present in the leaves and also in the new wood in much larger quantities than any other plant-food constituents, nitrogen coming second, followed in their order by potash, magnesia and phosphoric acid.

In the new wood, the plant-food constituents used per acre are greatest in the case of peach trees, after which come in their order plum, pear and apple.

THE AMOUNTS OF PLANT FOOD REQUIRED BY AN ACRE OF BEARING APPLE TREES COMPARED WITH OTHER FARM CROPS.

It will be interesting to note the following comparison between the amount of plant food used per acre for trees in full bearing, as already reported, and the amount of material ordinarily used by the different farm crops, as shown in the following table:

AMOUNTS OF PLANT FOOD USED PER ACRE BY BEARING APPLE TREES AND OTHER FARM CROPS COMPARED.

	Nitrogen, lbs.	Phos. acid, lbs.	Potash, lbs.
Apple:			
Fruit	20.0	8.5	45.0
Leaves	30.0	5.0	9.5
New wood	1.0	0.5	0.6
Total	51.0	14.0	55.1
Corn, 30 bushels per acre:			
Grain	27.6	12.0	10.0
Stover	14.3	0.6	22.0
Total	41.9	12.6	32.0
Wheat, 15 bushels per acre:			
Grain	16.6	8.5	5.0
Straw	16.8	7.6	19.0
Total	33.4	16.1	24.0
Timothy hay, 1½ tons per acre	35.4	22.8	38.0

The notion that a bearing orchard requires an insignificant quantity of plant food as compared with the ordinary farm crops is shown by this table to be entirely wrong. In fact, apple trees bearing a normal crop require for fruit, leaves and new wood more pounds of each of the three commercial elements of plant food, viz., nitrogen, potash and phosphoric acid, than a thirty-bushel crop of corn for the grain and stalks, and very much more than a fifteen-bushel crop of wheat and its accompanying straw.

MAKING THE PLANT FOOD IN THE SOIL AVAILABLE.

As is well known, only a small portion of the plant food contained in any good soil is at any one time available to growing crops. The processes which render this plant food available are going on, more or less actively, practically all the time. The rate, however, at which this food is made available to the growing tree will vary according to the season and to the method of treating the soil.

For example, during an excessively wet season, when the soil is either

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water-logged or being leached much of the time, there is unlocked in the soil a relatively small amount of plant food, and much of that which was already made available is lost, either temporarily or permanently, through the processes of leaching. This means that the soil should be watched carefully the year following an excessively wet season. This is particularly true if the trees following such a season happen to set a large crop of fruit.

Then, during a very wet season the soil solutions are so diluted that the trees will actually find less plant food and have greater difficulty in getting that which they do find.

Likewise, in a very dry season the chemical and biological changes are very much retarded, owing to the absence of moisture. Nevertheless, it should be remembered that in such a season the movement of soil moisture is upward from great depths, and large quantities of moisture are brought to the surface and vaporized. The plant food that had in wet seasons been carried beyond the depths of the ordinary growing crop is brought to the surface by this upward movement of the water, and by the vaporization of the water deposited there in a readily soluble form. This does not mean, however, that the plants derive benefit from these salts during the drought, for there is not sufficient moisture in the soil to make this possible. Therefore, while a dry season does not favor the breaking down of the plant-food compounds in the surface soil, it does in fact favor the accumulation of this soluble plant food in the surface soil, by bringing it from great depths, and also by the limited amounts used by the trees on account of the small fruit crop and the very sparse growth they make in such an unfavorable season.

Thus should we expect, following a very dry season, an extraordinary season of growth, and if by any treatment in that dry season we can without permanent injury to the trees induce them to set a good fruit crop the following year, it is very likely to prove exceedingly favorable for the development of this fruit. Not only are the conditions likely to be favorable for the development of a fine crop of fruit following a dry year, from the standpoint of an abundance of plant food to mature a maximum crop, but from the standpoint of a diminution of insect pests and a reduction of the prevalence of fungous diseases.

In the ordinary season it is necessary for orchardists to put forth some effort in order to unlock the plant food contained in this soil. The conditions most favorable for the unlocking of this food and rendering it available are the presence of air, carrying as it does free oxygen, and carrying also carbonic acid gas, which is indirectly a very powerful solvent. Thus the systematic aeration of the soil favors its breaking down and increases the ratio of available plant food. This aeration may be accomplished in two important ways—one by systematic tillage, another by keeping up the supply of vegetable matter. Humus or vegetable matter keeps the soil open and porous, so that the air may circulate freely, and in addition, through the decaying of organic matter, liberates a large quantity of carbonic acid gas, which we have just learned is effective in unlocking plant food. Humus also assists in maintaining a more uniform water content in the soil, preventing it from becoming water-logged for long periods after a rain and preventing it from drying out to that point where very little or no chemical changes occur.

In soils deficient in humus this dry condition occurs, as a rule, in mid-

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summer, when the temperature and other conditions are naturally most favorable to the breaking down of the soil, and at the same time when the trees are carrying the maximum of fruit and when they stand in greatest need of a copious supply of moisture and plant food. And even if the trees are not carrying fruit, they need food at this time of the year to mature the growth they have started in the spring and to fill out and perfect the fruit-buds they have formed, in order that both wood and buds may be in good condition for the succeeding winter.

HUMUS AN IMPORTANT FACTOR.

Thus does humus play a very important part: (1) In keeping the soil from washing; (2) in keeping it from becoming too dry in midsummer; (3) in keeping it cool in the heat of the summer; (4) in draining it in a manner; (5) in assisting in unlocking mineral plant-food; (6) in holding in an available form and in preventing loss by leaching of the mineral constituents; (7) in adding nitrogen; (8) in making the soil warmer in spring; (9) in making the soil more friable and loamy, and therefore cheaper and easier to handle.

As to the best methods of getting this humus in orchard soil, circumstances must govern in all cases.

On land of fair fertility and not so rolling as to prohibit cultivation on account of washing, it has been found most profitable to employ both cultivation and humus for aerating the soil and unlocking this plant food. That is to say, cultivation is carried on from the very earliest spring until the buds for next year are fully formed and until after the differentiation between fruit and growth buds occurs, say the latter part of June or early July, when this treatment in the ordinary season and under average conditions ceases, and the land is seeded to some crop that will cover the surface during the middle of the summer, autumn, and if possible during the winter, to prevent washing, and to prevent as far as possible the alternate freezing and thawing that favors the eroding of the surface. This growth should not be so rank as to be difficult to incorporate with the soil the following spring. At the same time, it should be of rank enough growth to produce a goodly supply of vegetable matter. For this reason, the orchardists of the East, particularly of New Jersey, Delaware and Maryland, employ the Crimson clover. This crop may, in my judgment, be successfully employed on the southern slopes of the Ozarks in seasons when there is sufficient rainfall in early September to insure germination and a good start, but is not reliable north of that point.

A second crop, and a much more important one for this purpose, is the cow-pea. There is less risk of crop failure from its use, and it stands the drought better than any other legume known to us and has greater ability to get along on a variety of soils and produce a large growth and to accumulate a large quantity of nitrogen. Unfortunately, the plants die with the first frost, and the land is not, therefore, so well protected in winter against washing as is the case when Crimson clover is grown.

In favorable seasons the ordinary Red clover may be sown in July and a good winter cover and a liberal quantity of humus secured, to be disked or plowed in the soil the following spring.

It too often happens that the orchardist limits his effort to the supplying of humus and nitrogen through leguminous crops, and trusts to the soil en-

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tirely for the mineral ingredients necessary to the proper nourishment of his orchard. He should remember, however, that on many soils the introduction of the humus and the cultivation necessary to incorporate it with the soil, while effective in unlocking the mineral constituents, do not operate rapidly enough to supply the trees in full bearing with the necessary potash, and in some cases the phosphoric acid, required. To make the nitrogen that he is adding to the soil really effective it is necessary to introduce, in a commercial fertilizer, a quantity of potash and phosphoric acid. As is pointed out elsewhere, the application of these minerals in amounts somewhat in excess of the immediate requirements of the trees is not such a serious waste, in view of the fact that, unlike nitrogen applied in available form, comparatively little of these elements of plant food is lost when not used by the growing plants the first season. Under good handling practically all of the potash and phosphoric acid may be recovered in succeeding crops, in case more than is needed is applied at one time.

IMPORTANCE OF TILLAGE.

As has already been pointed out, tillage will greatly facilitate the liberation of the mineral food of the soil, and it should not be forgotten that a relatively large quantity of these minerals is required. For example, a considerable part of the ash of wood-growth is potash; considerably more than half of the ash in fruit consists of this material, while, as we know, this element forms the basis of the common fruit acids.

The western orchardist has, I believe, led in the extent and thoroughness of orchard cultivation, and the eastern man, particularly the New England, New York and Pennsylvania fruit man, has been disposed, in the past, to look with disapproval upon this western practice. It appears, however, from recent reports issued by the Cornell University, that the sod treatment of bearing orchards, even on the best apple land of New York, is proving less profitable than the culture treatment. It is true that only about eleven per cent. of the orchards there have been in cultivation during the past five years, while thirty-three per cent. have been in sod in this leading apple-export county of New York, where some eight per cent. of the entire tillable area of the county is in apple orchards, and where are about one twenty-fifth as many apple trees as in the entire state of Missouri. Of the young orchards, however, it may be of interest to note that only thirty-six per cent. of the area is sown to grass, nine per cent. sown to small crops, while the remaining fifty-five per cent. is given clean culture.

YIELD OF CULTIVATED AND UNCULTIVATED ORCHARDS CONTRASTED.
Five-year average per acre, 1900–'05. Orchards all well cared for.*

	Bushels.	Income.
Tilled ten years or more	337	$189 00
Tilled five years or more	296	148 00
Tilled over half of preceding five years	234	121 00
Sod over half of preceding five years	242	118 00
Sod five years or more	258	134 00
Sod ten years or more	232	117 00

It should be noted that these orchards were all well cared for, all receiving some fertilizer, and were sprayed, yet cultivation showed an increase in

*An Apple Orchard Survey of Orleans County, New York. Bulletin 229, Cornell University.

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the average return during the last five years of seventy-two dollars per acre, or sixty-one per cent., as compared with similar orchards grown in sod.

In another report from the same institution,† on Wayne county, New York, a county producing apples chiefly for evaporating purposes, some very interesting and valuable data still further emphasizing the advantages of tillage are presented, of which the following is a brief summary:

WAYNE COUNTY, NEW YORK, YIELD IN BUSHELS OF TILLED AND UNTILLED ORCHARDS.

	Number orchards.	Acres.	Average yield.
			Bushels.
1900.			
Tilled five years or more	35	222¾	341
Tilled most years	36	298½	309
Sod most years, tilled occasionally	43	241	301
Sod five years or more	51	620½	156
1901.			
Tilled five years or more	32	232¾	82
Tilled most years	38	319	73
Sod most years, tilled occasionally	54	292½	56
Sod five years or more	69	609	31
1902.			
Tilled five years or more	53	483¼	317
Tilled most years	67	428½	279
Sod most years, tilled occasionally	85	491½	214
Sod many years	122	1,100½	176
1903.			
Tilled five years or more	31	379	325
Tilled most years	24	125	255
Sod most years, tilled occasionally	31	225¾	238
Sod five years or more	43	368½	230
Four-year averages per acre:			
Tilled five years or more			266
Tilled most years			229
Sod most years, tilled occasionally			202
Sod five years or more			148

Thus it is seen that orchards tilled five years or more produced 266 bushels per acre, while those that had been in sod for five years or more produced only 148 bushels per acre, as an average for the four years from 1900 to 1903. When it is realized that this represents a large number of orchards and involves thousands of acres, the figures are entitled to the greatest weight.

In one sense the foregoing figures are misleading, in that they include all of the orchards examined, whether well cared for or neglected. It goes without saying that the man who does not cultivate is likely at the same time to fail to spray, prune, fertilize, etc., and that the benefits of tillage in these figures are magnified.

Eliminating all of the orchards that were in any sense neglected, and taking those where the only difference in management was tillage, we have the results as shown in table on page 241.

† Cornell University Bulletin 226. An Apple Orchard Survey of Wayne County, New York.

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WAYNE COUNTY, NEW YORK, YIELD OF APPLES FROM TILLED AND UNTILLED ORCHARDS.*

Average of the county for trees set before 1880. All orchards well cared for.

Treatment.	Number.	Acres.	Average yield.	Four-year average yield.
1900.				
Tilled five years or more	25	175¾	348	.....
Tilled most years	22	181	353	.....
Sod most years	24	209	260	.....
Sod five years or more	25	206	224	.....
1903.				
Tilled five years or more	23	345	326	271
Tilled most years	16	99½	249	245
Sod most years	15	122	257	208
Sod five years or more	22	157¾	263	200

*Cornell University, Bulletin 226.

"The real difference, therefore, due to sod or due to the lack of tillage, is between eighty per cent., shown in the table including all of the orchards, and thirty-five per cent., shown in the table relating only to the orchards well cared for."

It does not follow that under any and all circumstances an orchard should be tilled. In many cases the land is too rough and stony, and in other cases, if the orchards are giving good yields and the trees are making sufficient growth to keep up their vitality, it is possible that it will be safe to allow them to remain in sod. By the liberal use of barn-yard manure it is possible to keep an orchard in good condition without tillage.

It should be remembered, however, that the results of good and bad treatment are not always apparent the first year. The great difficulty in determining what kind of treatment pays best in any particular orchard is the fact that it may be several years before the results are apparent in the difference in crops. Very frequently a grower has followed a few years of good care by a period of neglect, and has received an increased yield as a result. The trees may be making almost no new wood, and may be easy victims to insects, drought, and disease. Yet the increased crop may have persuaded the grower that this is the most profitable treatment.

"No care can be good that does not take heed of the future of the orchard. In some cases the orchard may need such treatment as will actually decrease the yield for several years, in order that new wood may be formed and new vitality given the tree. On the other hand, it frequently occurs that the orchard is growing too fast, producing too much wood, and is not as fruitful as it should be, and will need such treatment as will retard growth and increase fruitfulness."

It is claimed by some that apples from uncultivated orchards are more highly colored, have a higher flavor, are firmer and keep better.

On the other hand, these apples are usually smaller, and statistics recently compiled by the Cornell University* show that the apples from cultivated orchards sold for a slightly higher price per bushel during the past five years than did those from the orchards that were not cultivated. That is to say, the extra size of the apples from the cultivated orchards more

*An Apple Orchard Survey of Orleans County. Bulletin 219.

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than compensated for whatever difference in color, flavor or firmness there may have been.

It may be said, in passing, that the apples of the Ozark region and of the river bluffs of Missouri are likely to be sufficiently well colored for all practical purposes, without adopting the apparently unprofitable practice of growing the trees in sod.

BENEFICIAL RESULTS FROM CULTIVATION IN MISSOURI.

Unfortunately, the commercial-orchard industry in Missouri is too young to permit the gathering of such data from our own experiences as have been presented for the two leading apple counties of New York.

Professor Whitten, of the Missouri Experiment Station, gathered a number of years ago * some very important data on the difference in the rate of growth of trees cultivated and uncultivated, of which the following table is a summary:

TABLE SHOWING INFLUENCE OF CULTIVATION AND CARE UPON THE GROWTH OF APPLE TREES.

No.	Variety.	Age, yrs.	Growth, in inches.				Kind of cultivation.
			1895	1896	1897	1898	
1	Ben Davis....	7	17.6	21.7	23.2	24.5	Clean cultivation throughout each growing season.
2	Ben Davis....	11	12.1	12.4	16.6	14.5	Clean cultivation until 1895; since then clean cultivation until June, when cover crop of cow-peas or clover was sown.
3	Ben Davis....	14	17.0	9.5	16.2	10.8	Clean cultivation until 1895; then seeded to clover, clover giving way to blue-grass in 1898.
4	Jonathan.....	9	17.2	9.3	13.6	11.0	Cultivated with corn between trees until 1895. In clover since 1895; space cultivated under each tree throughout each summer.
5	Jonathan.....	10	7.3	6.6	11.4	9.6	Clean cultivation until 1895. Since then clean cultivation until June, when crop of cow-peas or clover was sown.
6	Genet.....	30	4.2	6.1	10.4	6.6	In blue-grass and clover; some cultivation around each tree.
7	Genet.....	30	3.6	5.5	8.9	4.4	In blue-grass pasture.
8	Genet.....	14	13.0	9.3	11.2	7.4	In clover; no cultivation since 1895.
9	Miscellaneous varieties....	15	11.0	11.8	19.6	12.0	Plowed each spring, cultivated, seeded in summer to cow-peas, rye or wheat.

It will be noted that in every instance the growth was materially larger wherever the orchards received good cultivation. Of more importance, it is shown that the trees under cultivation made a more uniform growth than did those that were in sod.

EFFECT OF FERTILIZERS IN OVERCOMING UNFAVORABLE CONDITIONS.

In the case of such disastrous droughts as in 1901, it is always the neglected and underfed orchard that suffers most. It is likewise true that underfed trees fall a victim to the attacks of borers, aphis, root-rot, etc., much more readily than those that are well nourished; as in the animal kingdom it is the starved animal that carries all the parasites known to the kingdom, whereas sleek, fat, well-fed animals escape their ravages.

When an unfavorable season finds an orchard well set with fruit the fact as to whether it has been well cultivated and is well nourished or not, in other words, as to whether there is present a reasonable supply of available

* Bulletin 49. Missouri Experiment Station, "The Apple Orchard."

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plant food in the soil, exerts a profound influence upon the effect of this unfavorable season upon the crop and upon the life and vitality of the trees. This is well shown in an experiment with peaches recently reported from the New Jersey Experiment Station.*

YIELD OF PEACHES IN UNFAVORABLE YEAR.

	Plat.	Baskets per acre.
1889	Unmanured	10.9
1889	Fertilized	152.5
1889	Manured	162.5

It will be observed that the unmanured plot yielded about 11 baskets per acre, while the manured plots produced more than 150 baskets. "The manure strengthened and stimulated the trees, and enabled them to successfully resist such conditions as were fatal to the crop on the unmanured land."†

NITROGEN SUPPLY.

On practically any soil in Missouri that is likely to be planted to orchard, it is possible to keep up the supply of nitrogen as well as the supply of humus by growing such crops as have been indicated, and at the same time pursue what is commonly known as "clean cultivation" for the orchard.

While the temptation is very strong to make land earn something during the early life of the orchard, when the trees are small and occupy but a small portion of the area, and when, without some such crop, the orchard is a dead expense, the utmost care should be exercised on the lighter and thinner soils, lest the supply of humus and of available plant food be to a large extent exhausted by the growing of such crops as corn, thus leaving the land in no condition to produce a thrifty and healthy growth of trees.

One can readily determine whether the nitrogen supply is inadequate for the trees by observing closely the color of the leaves and the length of the growth in the average season. When these leaves are somewhat sparse, that is, thin on the tree, pale or yellowish in color, it is certain that the soil is deficient in available nitrogen. Likewise, if the length growth in an average season, particularly when there is no fruit crop to nourish, is deficient, the limbs knotty, the bark rough, instead of the new growth being long, straight and having a smooth bark, we may conclude that there should be more nitrogen present in the soil to normally develop the tree.

If, on the other hand, the opposite of all these conditions are to be observed, that is, an abundant growth of foliage of a dark, rich green color, and the new growth is ample, we may say that the soil is supplying plenty of nitrogen, and that it is not necessary to add more. When these latter conditions are emphasized, that is, when there is an unusual and even an unnecessary leaf and wood growth, when the vegetative processes are particularly active at the expense of fruitfulness, we may conclude that there is more available nitrogen than is necessary, and it will be profitable to grow some crop in the orchard that will remove a portion of this nitrogen, such as a corn crop, if the trees are small enough to make this feasible, or of timothy in an older orchard, the timothy being mown and removed from

* Voorhees, "Fertilizers." Page 295.

† Voorhees, "Fertilizers." Page 297.

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the land. It is never advisable, however, to allow orchards to remain long in timothy, even though it be necessary to plow the land in the spring, cultivate during the summer and resow in September, for while in sod there is a tendency for the tree roots to develop very near the surface, and if this process be permitted to go on for several years there will be a serious disturbance of the root system when the land is again put in cultivation.

SUPPLYING MINERALS.

The mineral element of plant food required in the largest quantity by the fruit, as has already been pointed out, is potash. Only about one-fourth as much phosphoric acid as potash is required. A relatively large amount of lime is required for the development of the leaf. By reference to the table of the composition of soils, already presented, it will be observed that the content of potash is relatively large in most of our Missouri soils, particularly if we consider the subsoil to a depth of three feet, which is certainly not beyond the reach of a growing tree on any soil on which a sane man would plant an orchard. In other words, there would seem to be sufficient potash to supply all the needs of trees for many years to come, and that this would be one of the last elements to be supplied artificially. Considering, however, the special need of bearing trees for potash, it is believed that this element can be profitably applied over most of the Ozark region at any rate.

The amount of phosphoric acid in the soil is not nearly so large, and perhaps is rendered available more slowly, and is one of the first elements to be exhausted under the ordinary system of grain farming.

Land, therefore, that has been grown in the ordinary farm crops for many years before it was planted to orchard is quite likely soon to need a limited supply of phosphoric acid in some reasonably readily available form. Virgin soils planted to orchards would naturally seem to be less in need of this element, and at the same time, when it is considered that these soils are in all probability thinner and contained originally a much smaller amount of phosphoric acid than the lands that were brought into cultivation earlier, as will be seen by observing the composition of the red limestone land, or of the pine ridge land, shown in the table of plant food in soil. It is likely, therefore, that if two or three corn crops have been taken off of this land while the trees are young, that it will stand in very sore need of a limited amount of phosphorus in some artificial form.

In view of the great abundance of limestone in Missouri and of the fact that most of the soils of south Missouri are the result of a limestone decayed in place, it has been assumed that our soils are very rich in this element and that it would be a waste of time and money to apply lime.

All of the analyses thus far made in our soil-survey work indicate, however, much to our surprise, that many of our soils are really deficient in this element, and have possibly an overplus of magnesia. It is therefore a serious question whether lime may not be very profitably applied on a great variety of our soils. This is especially true of those soils which have been in cultivation long enough to develop an acid condition so that the legumes do not thrive well.

FORMULÆ FOR SPECIFIC CROPS.

In earlier times the chemist, in recognition of the fact that different time is required for the normal development of different classes of plants—and they require plant food in different amounts and in somewhat different pro-

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portions—suggested various formulæ adapted to the requirements of different crops, as, for example, a formula for a cotton fertilizer, another for wheat, and a somewhat different one for corn, etc. It has often occurred in practice, however, that the so-called corn grower would produce on some soils better wheat than the fertilizer especially designed for this crop, and *vice versa*. This is not to say that much cannot be learned concerning the fertilizing of different fruits by studying the amounts and proportions of plant food required for their normal development, but to rely upon these data alone would lead us into costly errors.

DIFFERENCE IN AVAILABILITY FOR DIFFERENT KINDS OF FRUIT.

This does not mean, however, that one fertilizer would be as well adapted to one fruit as to another. That is to say, there are qualities in a commercial fertilizer outside of the chemical composition which affect very materially its value and adaptability to particular uses. Chief among these qualities is the ease with which the elements of plant food contained therein are available. Under some conditions a very readily available plant food is required; under others, one that acts more slowly is much to be preferred.

For example, it would perhaps be dangerous to use very much of a very quick-acting fertilizer, especially if it contained very much nitrogen, on pears, for it is quite likely to leave the tissue in such a condition as to fall easy prey to blight. Likewise, it is as a rule not advisable to apply large quantities of a readily available plant food to apples.

On the other hand, a peach orchard located on comparatively thin land and loaded with fruit would be greatly benfited by a liberal quantity of a very readily available food. The same would be true of all the small fruits.

A safe rule in all cases would be, in making up a commercial fertilizer, to supply a small quantity of immediately available material and furnish the remainder in a slow-acting form, so that a uniform supply of food may be provided and a steady and uniform growth promoted. This is more particularly true of nitrogen than of the mineral elements. To secure this condition with nitrogen the readily available material may be supplied in the form of nitrate of soda, or preferably dried blood, or cottonseed-meal, and for the slow-acting material barn-yard manure, tankage or a pure raw-bone meal; or, cheaper than any of these, cow-peas or clover.

In the case of phosphorous, a small quantity of acidulated rock would furnish the material required for immediate use, and the remainder could be more advantageously supplied in steamed bone, or much cheaper and probably quite as well in the long run in finely ground raw phosphate rock. In this case it will always be necessary to plow under vegetable matter frequently to facilitate the unlocking of this phosphorus.

DANGERS THAT MAY FOLLOW THE USE OF FERTILIZERS.

If care and judgment be exercised in the amount of nitrogen applied and the season of the year in which the application is made, whether it be commercial fertilizer, barn-yard manure, or a leguminous crop turned under, there will be no unfortunate results to follow. The only disadvantage in applying too much potash and phosphoric acid comes from the expense of buying an unnecessarily large amount of these ingredients. They will not cause too much wood growth, as will an excessive amount of nitrogen, and will not, so far as we know, diminish the tendency toward fruitfulness, or cause a late growth, or prevent a proper ripening of the wood for winter,

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or produce a soft and immature tissue that is especially subject to the attacks of fungous diseases. In truth, they and lime have just the opposite tendency.

Special care, then, need only be exercised in the application of nitrogen. The wood and leaf growth, as has already been pointed out, will show whether sufficient nitrogen is being supplied or not, and any excessive growth of leaf or twig will be conclusive evidence that too large a quantity has been used.

Such a mistake in a young orchard may be readily remedied by planting to corn and removing both the corn and fodder, and in the case of large trees that seem to have been overfed with nitrogen, seed to timothy, removing as hay the crops, and by one or the other of these means the danger is quickly removed.

The utmost care, however, should be taken not to carry this depleting process too far. It is like bleeding a patient for some malady—a most excellent thing to do when the patient really requires to be bled, but not a good thing if the bleeding process is carried too far.

This cropping under all circumstances is a great temptation, as it is reducing the expenses of handling and giving an additional return from the land; but if carried to the extent of depleting the soil and no effort be made to restore the fertility thus removed, the small return obtained from the farm crop will be much more than lost in the reduced vigor of the orchard and the diminishing crops of fruit.

As has already been pointed out, it is especially bad policy to have the land alternately rich and poor. Better trees and better fruit will be obtained by a consistent policy of one side of the proposition or the other, and rather a somewhat underfed tree, existing under uniform conditions, than one that is this year underfed and next year overfed, or that is alternately rich and poor.

PHOSPHORIC ACID.

The commercial forms of phosphoric acid vary in availability more than do those of any other element. We have every grade, from the immediately available forms of dissolved bone black and dissolved rock, through the medium-acting forms of raw and steamed bone, to the very slow acting, finely ground, untreated phosphate rock.

It depends very much upon how one is situated as to which of these forms it will be most profitable to employ. Unless one has an orchard of bearing age that is very badly run down and needs immediate stimulation, there is no need for the employment of a very quick-acting, readily available and high-priced dissolved bone black; besides, the cheaper form of acidulated rock will furnish quite as readily available phosphoric acid.

Under many circumstances the choice would lie between the two forms of bone-meal, namely, pure raw-bone meal, and steamed-bone meal. The essential differences are, the raw-bone meal is more readily available, contains a higher content of nitrogen, from 3 to 4 per cent., and a smaller content of phosphoric acid, from 18 to 22 per cent., and these ingredients cost something more per pound than in the steamed bone. Steamed bone is the residue after the extraction of the glue from the bone, and leaves it poorer in nitrogen, containing only from 1½ to 2½ per cent., but richer in phosphoric acid, containing from 23 to 26 per cent., but neither of these ingredients is

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so readily available, the fertilizer being what would be termed slow-acting, and is the cheapest form of finely ground bone.

At the present time the cheapest source of phosphoric acid is the finely ground raw rock, which contains from twenty-eight to thirty-two per cent. of phosphoric acid, and will cost, laid down at an average point in Missouri, about $7.50 or $8 a ton, in car lots. This means that a ton of rock contains from 560 to 650 pounds of phosphoric acid, making this material cost, laid down at the farmer's station, 1.2 to 1.3 cents a pound.

If the orchardist buys this material after it has been treated with sulfuric acid, the best he can hope for is for a ton to contain 300 pounds of phosphoric acid, for which he will be obliged to pay, laid down at his station, from fifteen to eighteen dollars, which means that the available phosphoric acid in this form will cost from five and one-half to six cents per pound. In other words, for the same money that 300 pounds of available phosphoric acid can be purchased, about 1270 pounds of unavailable material can be secured, or about half the quantity usually found in the first ten inches of an acre of our good land.

Experiments conducted at the Pennsylvania Experiment Station and a number of other places, extending over a long series of years, clearly indicate that this material can be rendered available rapidly enough for all crop requirements by good tillage and by keeping a goodly supply of humus in the soil, both of which are necessary for other reasons in orchard management.

In the matter of the amount of phosphoric acid to apply, it will depend necessarily upon the extent to which the soil has been depleted and the age and condition of the orchard, and what other crops are in the near future to be removed. If the trees are just coming into bearing and the land has not been hard cropped with corn or other grain crops, from 100 to 150 pounds of bone-meal per acre, or 400 pounds of rock phosphate, will be sufficient to apply once every third or fourth year for ten or twelve years, when there would be sufficient phosphoric acid to satisfy all of the demands of the orchard perhaps until its usefulness had ended. As has already been shown, the amount of phosphoric acid used by bearing orchards is not large, but most Missouri soils are depleted of this material earlier than any other, with the possible exception of nitrogen.

RELATIVE VALUE OF DIFFERENT FORMS OF POTASH SALTS.

Generally speaking, the supply of wood ashes has been exhausted. This leaves two important forms of potash in commercial fertilizers, commonly known as the muriate of potash and the sulfate of potash. One is quite as readily available as the other, since the potash in both of the salts is readily soluble in water.

For general agricultural crops, such as corn, wheat, timothy, etc., and perhaps for potatoes that are sold on the open market in a mature condition, the muriate serves every purpose and is considerably cheaper than the sulfate. It has long been known, however, that the presence of the muriate exercises a deleterious effect upon the quality of certain delicate and very sensitive crops. For example, a high-grade cigar tobacco cannot under any circumstances be grown with this salt. Grapes do not produce a high-class wine when fed upon a muriate. Early potatoes are edible and palatable much younger and come on earlier when fed upon a sulfate than a muriate.

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It has been assumed by practically all of the agricultural chemists of the country that for the ordinary fruits, such as the apple, peach, pear and plum, the muriate is quite as effective. Therefore, in all of the fruit formulæ the potash is suggested to be in the form of a muriate on account of its relative cheapness.

Some experiments now in progress, however, at the Massachusetts Agricultural Experiment Station, indicate that a sulfate is superior to a muriate. The results have not been published, and it is through the courtesy of Dr. Wm. P. Brooks, professor of agriculture and acting president, that I am permitted to make the foregoing statement.

In a recent letter to the writer, Doctor Brooks says: "One of the most striking points brought out by our experiments, which began with the setting of the orchard in 1894 and have continued since, is the great superiority of the sulfate over the muriate as a source of potash. The tree girth is considerably greater in the case of those trees receiving a combination of sulfate of potash and bone-meal than in the case of those trees receiving muriate of potash and a smilar amount of bone-meal. It is also important to note that the trees receiving the sulfate of potash have borne the largest quantity of fruit of any in the experiment. The fruit on the plot receiving 20,000 pounds of barn-yard manure per acre each year is in general rather coarse and slightly inferior both in quality and in appearance, while the fruit on the plot receiving wood ashes is superior in appearance and quality to all other methods of treatment. The fruit on the plot receiving the sulfate of potash and bone-meal is considerably superior in appearance to that on the plot receiving the muriate, and ranks next in this respect to the fruit grown from wood ashes."

All things considered, wood ashes, unleached, applied at the rate of from 600 to 1000 pounds per acre, will be as good a form of potash as can be found, provided the cost per pound for actual potash in this form is not more than that of the sulfate. Recently some of the large packers have used large quantities of wood in curing their meats, leaving a high-grade wood ash available for a fertilizer at a reasonable price. When this is available and the cost is not too great it is to be recommended. When a supply of wood ashes is not available, I should recommend a sulfate at the rate of about 2 pounds per bearing tree, or 150 pounds per acre.

For the growing trees, before they come into bearing, I am inclined to the opinion that the muriate would be good enough, and should be applied in the vicinity of the tree at a rate which would apply about 100 pounds of actual potash per acre, which means 200 pounds of muriate salt.

It is claimed by many fruit growers that the use of potash as a fertilizer in bearing orchards will favor the development of high color in the fruit and cause the trees to hold their fruit better. In this connection, Professor Taft, personally known to most every Missouri horticulturist, writes: "The Michigan orchardists have found that the use of mineral fertilizers tends to the production of fruit-buds, and that the flavor and color of the fruit is enhanced. In numerous instances that have come to my knowledge, the difference in the amount of fruit blown from the trees that have been fertilized with phosphoric acid and potash in severe wind storms, as compared with the amount lost from unfertilized trees, was more than sufficient to pay the entire cost of the fertilizer."

In some instances liberal applications of lime have accomplished the

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same results, which may be due either to a deficiency of lime in the soil or to the fact that the added lime liberates a portion of the potash already contained in the soil, so that the indirect effect is the same as the application of potash. Certainly, on many of our soils, if lime is applied, it is not necessary to apply a potash the same season, as the lime is quite likely to liberate sufficient potash for all of the requirements of the trees for that year.

FEEDING THE PEACH.

As is well known, the habits of growth of the peach are quite different from those of the apple or the pear. The former grows more rapidly, comes into fruitfulness earlier, produces a relatively larger quantity of fruit, which has a much shorter season of growth than either the apple or the pear. It is, therefore, as might be supposed, a somewhat more exhaustive crop, and requires the plant food in a more readily available form than either the apple or the pear. In practice it has been found, as would necessarily follow from these facts, that no fruit is more sensitive to thorough cultivation and good treatment than the peach. It is necessary to aerate the soil more thoroughly than with any other fruit.

Fortunately we have from the New Jersey Experiment Station the results of some very excellent fertilizer experiments which extended over a rather long period of years, that will be very helpful in this connection. The soil upon which these experiments were conducted was of moderate fertility, of good mechanical condition, and considered to be fairly representative of the peach lands of the Atlantic coast. The fertilized plots received annually:

	Pounds per acre.
Nitrate of soda	150
Bone black superphosphate	350
Muriate of potash	150

This particular fertilizer would cost at present prices about $6.50 per acre, although it would be possible to buy an equally good fertilizer here in the West for less money.

Those plots having barn-yard manure received twenty tons per acre per year. The following shows the results:

	Baskets per acre.
I. The yield without manure.	
1884-1891, inclusive, 8 years, average per year	65.7
1884-1893, inclusive, 10 years, average per year	60.3
1887-1891, inclusive, 5 crop years, average per year	105.0
1887-1893, inclusive, 7 crop years, average per year	86.2
II. Yield with complete chemical manure.	
1884-1891, inclusive, 8 years, average per year	164.2
1884-1893, inclusive, 10 years, average per year	183.4
1887-1891, inclusive, 5 crop years, average per year	262.8
1887-1893, inclusive, 7 crop years, average per year	262.0
III. Yield with barn-yard manure.	
1884-1891, inclusive, 8 years, average per year	169.5
1884-1893, inclusive, 10 years, average per year	194.7
1887-1891, inclusive, 5 crops, average per year	271.3
1887-1893, inclusive, 7 crop years, average per year	276.8

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It will be observed that the yield was very materially increased by feeding the trees either with commercial fertilizer or with barn-yard manure. The difference between commercial fertilizer and barn-yard manure was in this case not material.

It should be remarked in this connection that the amount of plant food supplied was much larger in the barn-yard manure in this particular case than in the commercial fertilizer, indicating that a smaller amount than was given in the form of barn-yard manure was sufficient to produce maximum crops. For example, in ten years the fertilized plots received—

	Pounds.
Nitrogen	250
Phosphoric acid	560
Potash	750

whereas, the trees receiving barn-yard manure were fed a total in ten years of—

	Pounds.
Nitrogen	2,000
Phosphoric acid	2,000
Potash	1,600

As in the case of the other fruits, one must exercise the greatest care not to overfeed with nitrogen, which over-stimulates the vegetative tendencies of the tree, belating and minimizing the fruitfulness; besides, such fruit as is produced is lacking in color and flavor and is much more liable to the attacks of fungous diseases.

FEEDING THE PEAR.

The dwarf varieties require better cultivation, more uniform and heavy fertilization than do the standard sorts, for the reason that the quince roots upon which they are grown feed from a much more restricted root area and near the surface, in proportion to the wood growth they make and the fruit they bear. It is self-evident also that the fertilizer should be applied nearer the tree than in the standard sorts.

In fertilizing the pear, however, it should be remembered that the permitting of a rank growth through the supply of a liberal quantity of available nitrogen makes the tree much more subject to blight and leaves the wood in such a condition that this disease is particularly fatal.

This has led to the very common practice of planting pears on relatively close, thin land, giving very limited cultivation, oftentimes none at all, and keeping the tree in what is commonly considered a half-starved condition, so as to develop a wood that is resistant to the attacks of this disease. It is for the practical grower to determine in either case which of these policies he will pursue.

HOW TO TELL WHAT SORT OF FERTILIZER THE ORCHARD NEEDS.

After all that is said and done, the only way to determine accurately what a bearing orchard on a given soil needs is to try it, and under ordinary circumstances it will be necessary to continue this experiment over a considerable length of time. Certainly it would not be sufficient to apply the

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fertilizers in the spring and expect a full and profitable return in the crop that same season. It is possible that the influence of this application may not manifest itself for two or three years, and it may continue to exert an influence for five or six years.

The best plan, therefore, would be to repeat the application at the end of about the third year, taking special pains to note the difference in the growth and vigor of the trees under each treatment, the color of the leaves and the amount, size, color and soundness of the fruit.

It will not be sufficient, however, to trust one's eye to determine the difference in the fruit. A difference of twenty-five per cent. may be easily undiscovered, whereas this difference might show a very large profit on the use of a commercial fertilizer.

Men engaged in the orchard business at all extensively can afford to make these experiments accurately, weighing the crop of fruit from each plot carefully, and keeping a record from year to year until the experiment is closed.

The following scheme will serve as a general guide and be sufficient for a preliminary test. It is not to be assumed that the particular kinds of fertilizers proposed in this plan are the ones that would be necessarily recommended for use in actual practice, but these are selected for the preliminary test, in the main because of the convenience with which they may be procured and the uniformity of their quality on the market. Later, if it be shown by results, for example, that nitrogen is required, it would be very easy to get it in a cheaper form than nitrate of soda.

PLAN OF PRELIMINARY TEST OF FERTILIZERS.

Plot. *Treatment.*

1. Nothing.
2. Muriate of potash, 150 pounds per acre; pure raw-bone meal, 250 pounds per acre.
3. Dried blood, 200 pounds per acre; pure raw-bone meal, 200 pounds per acre.
4. Muriate of potash, 150 pounds per acre; dried blood, 200 pounds per acre.
5. Muriate of potash, 150 pounds per acre; dried blood, 200 pounds per acre; pure raw-bone meal, 200 pounds per acre.
6. Nothing.
7. Barn-yard manure, 10 tons per acre.
8. Lime, 2000 pounds per acre.

APPLICATION OF COMMERCIAL FERTILIZERS.

On mature bearing orchards that are occupying the entire ground, it is quite as well to make the application broadcast and in the spring, immediately before the first cultivation, letting the tillage given mix the fertilizer with the soil.

In the case of barn-yard manure, it is possible and advisable to make the application in the autumn, after the ground is firm, say from the 1st of November on, unless the land be very steep, so that there will be serious loss from surface-washing. The material would then be incorporated with the soil by the early cultivation, just as in the case of the commercial fertilizer.

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SOME PROBLEMS OF COÖPERATIVE MARKETING.

By J. P. GRAVES, Neosho, Mo. Read before the Illinois State Horticultural Society.

It is coming generally to be believed that it is best for fruit growers to coöperate in selling their fruit. There is an exception to the general rule. If a man is a capable business man; if he is an intelligent fruit grower; if he thoroughly understands all the details of the fruit business; if he understands what and how to plant; if he understands the best methods and objects of cultivation; if he understands how successfully to combat insect pests and fungous diseases; if he understands how properly to thin, prune and feed his fruit; if he understands how to gather, grade and pack it; if he understands what kind of packages to use; if he understands what markets to put his fruit into; if he knows how to deal with track buyers and commission merchants; if he has a good reputation in the markets for honesty and the production of fancy fruit; if he knows how to collect his returns promptly and use them advantageously, and if he grows fruit on an extensive scale, then he would do better to ship independently and not to coöperate with his less intelligent and less skilful neighbor. But such a man is rarely found. Hence the general rule stands true.

The cotton growers of Texas organized to sell their cotton. The grain growers of Oklahoma organized to sell their grain. The truck growers of the South organized to sell their truck. The fruit growers of the far West organized to sell their fruit. All these found it to their advantage to do so. Through their organization they both lowered their shipping expenses and raised the price of their products. Craftsmen and tradesmen of many sorts and kinds have formed themselves into unions and federations of various sorts and names to raise the price of labor, and beyond all question they have raised it. They have raised it so high that a man can hardly hire a laborer at all. Fruit growers cannot afford to be one whit behind the very chiefest of American producers in the matter of concentration and organization. The more complete the organization, the more complete the advantage.

Down at Neosho, Mo., where is my home, we have an organization of fruit growers that has been fairly successful in its business, and has made a good reputation throughout Missouri and in all the markets where it has done business. Let me speak of that organization, of its workings, and results. I will not ask your pardon for talking about ourselves, for using personal pronouns, for I know it is personal experience you want to hear. Indeed, I was invited here by your worthy secretary to do that very thing. I would be "disobedient to the heavenly vision" if I did not do so. The only excuse I have to offer is, I have a divine call to speak that I do know, and to testify that I have seen.

We have an organization of about 140 members. It is mainly a strawberry organization, its work being almost exclusively the growing and shipping of strawberries. We have been organized about eleven years. At one time we had nearly 200 members. Some have died, some have moved away, some have lapsed and some have collapsed. About 140 remain to keep up the business. I have the honor at present to be the president of the organization. The officers of our society consist of president, vice-president, secretary, treasurer, and a business committee of five, one of whom is the corresponding secretary and business manager. We used to pay our

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business manager two per cent. of the gross sales of our fruit. Out of that amount he paid his assistant, the bookkeeper, the inspectors at the loading station, and all the helpers that were necessary to load the fruit upon the cars. When all these were paid there was left to the manager about $1000, sometimes a little more and sometimes a little less. Now we pay the manager one per cent. of the gross sales. He pays none of the expenses just referred to; the association pays them all. We prefer paying a commission to paying a salary, for three reasons: The commission has a tendency to stimulate the manager to do his very best for the growers, for the more fruit he can sell at a good price the more he will make for himself; in case of a shortage of crops he will fare and fall with the rest of us, and in case of a total failure we will not have to go down into our empty pockets and "dig up" to pay him for work which he did not do.

We put upon our business committee men of good judgment—men of recognized business sense. We select for our manager a man of demonstrated business ability—a man in whom the association has the utmost confidence, both in his competency as an agent and his honesty as a man. The business committee hold meetings as often as they think necessary to look after the interests of the association. They consider every subject thought to be of importance to the growers. They provide the growers with box and package material. They provide them with stamping outfits, and every grower is required to put his personal stamp on both ends of every crate, together with the variety stamp and the grade. On every crate of the "A" grade the manager puts the association trade-mark, a copyrighted stamp, which is the association's guarantee of high quality. They provide the growers with tally-sheets with which to keep the account of the berry picking. They provide them with pickers' and packers' rules, with bills and posters for advertising for pickers, and with all other needed supplies. They make arrangements beforehand with commission merchants to handle our fruit the ensuing season. They know before the berries are grown where the bulk of them will be marketed. We never sell to track buyers. We always consign to commission merchants. We have demonstrated to our satisfaction that it is to our advantage to do so. We get better prices than most of our neighbors who sell on track. We stand by the commission people in the beginning when the berries are the best, and they stand by us in the end when they are the poorest. Then the track buyers would desert us. The business committee arrange with the railroads for their share of the business. They arrange for plenty of refrigerator cars. They arrange for reicing cars in transit. They arrange with electric light and telephone companies for their services at the loading shed. They arrange with numerous men for their services as bookkeeper, inspector, loader at the stopping station, or instructor in the field. They look after all the details of the business, having authority to attend to it just as though it were their own.

We have a constitution and by-laws by which we are governed. In it is specified who may become members and upon what conditions they may remain. In it are pointed out the duties of the officers and members. In it is pointed out how the officers are paid for their services and the growers for their fruit. The secretary and treasurer are each paid twenty-five dollars per year. The members of the business and auditing committees are each paid two dollars per day for services actually rendered. The manager is

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paid one per cent. of the crop, and the president is paid in glory. The growers are paid their *pro rata* share of each day's sale. To illustrate: Suppose five cars are sold. One goes to Kansas City and sells for $2 per crate, one to Omaha and sells for $2.25, one to Denver and sells for $2.50, one to Minneapolis and sells for $2.75, and one to Duluth and sells for $3. We find the total net value of the five cars and the total number of crates in them. We divide the total net value by the total number of crates, and the quotient is the average price per crate and that is what the growers are paid. And so on to the end of the season. In the by-laws it is specified that the growers must deliver all the fruit which they have to sell to the manager, and they must not pay more than the association price for picking, which is 1½ cents per quart. In it is specified that the fruit must be carefully graded "A" and "B," and that if any does not meet the requirements of the "B" grade it will not be shipped at all. The only difference between the two grades is size. The "A" grade must be large. The "B" grade may be smaller, of medium size. But the little, dinky, buttony or warty berries must not be packed at all. All berries to be shipped, whether "A" or "B," must be sound, well-shaped, well-colored and clean, and the measure must be Scriptural, "pressed down, shaken together, heaped up, and running over."

Having thus briefly outlined the workings of our organization, I will now speak of some of the advantages of the organization and the problems it solves. An organization has the advantage of selecting its market agents. It can select from among its membership an executive board of good business men, and a business manager courteous in manner, shrewd in method, and accomplished in the ways of doing business. It is one thing to grow fruit; it is quite another to market it successfully. Fruit growing is a science; fruit selling a fine art. Fruit growing depends upon definite, fundamental, unchangeable principles; fruit selling depends upon uncertain, superficial, fluctuating conditions. In fruit growing one must study climates, soils, locations, varieties, planting, cultivation, pests, diseases, remedies, picking, packing, storing, delivering, and such things; in fruit selling one must study men, railroad companies, express companies, refrigeration companies, cities, panics, the condition of markets, industrial conditions, distribution of wealth, the standing of commission merchants, supply and demand, and such things. Fruit growing and fruit selling are two very different classes of business, so that a man might be a perfect success in one and a perfect failure in the other. For this reason we select for our business manager a wide-awake, thorough, capable business man. He is our selling agent. Daily, with his hands upon the wires, his ears at the phone, his eyes upon the market reports, and both his feet in the business up to his shoulders, he studies the markets, gets in touch with them, and sells the fruit. The rest of us, being relieved of the responsibility, study how to grow fruit, and give our undivided attention to its production. This is a decided advantage.

An organization has an advantage in being able to make better and more satisfactory banking arrangements for its members than they could make for themselves independently. Most any bank is willing to do business with fruit growers. Through the influence of the officers of an organization a bank will favor the members when they apply for an accommodation. It will lend money to them, taking their personal notes, if to them is attached

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an order to the business manager to pay off the note out of the first money received for the grower's fruit. This is an advantage to many growers, as it enables them to buy their package material in the winter when they can get it at a discount and have time to make it up. Further, during the picking season, if a grower wants money to pay his help before he has received his returns for his fruit, banks will advance enough money to pay all expenses, and generally without interest. This makes it easy for the growers to accommodate their pickers and other helpers without any trouble or embarrassment to themselves. These and other similar banking arrangements we have made at Neosho, and are the results of organization.

An organization can buy package and spraying materials, fertilizers, seeds and other supplies cheaper than an individual. This is one of the chief advantages of local organizations. Some associations use as much as ten car-loads of crate material in a single season. By buying this amount in a wholesale way of one factory at one time it can be bought for less money than the same amount can be bought in small lots of a local retail dealer by individual growers. By buying in such quantities jobbers are brought into close competition and they cut one another's prices. Competition brings prices down until the factories form a trust, and then prices are uniform. This trust business will drive the growers some day to own and operate their own mills, and when that time comes material can be bought cheaper than now. By buying at wholesale Neosho saved last year to the growers about $800. In the same way, the Hood River Apple Growers' Union saved last year to the growers $7500 on their apple boxes, paper, and spray material. In the same way, the fruit and vegetable growers of Alvin, Texas, not only saved many dollars on their box material and fertilizers, but reduced the price of their farm seeds one-half. Many other fruit unions throughout the country have sought and found the same advantage, and some western unions have recently been formed with this item especially in view.

By coöperation we have improved our shipping arrangements. We have reduced our shipping expenses and gained a better market for our fruit. Before our organization the growers shipped independently in small lots by express to near-by towns. But express charges are high—much higher than freight rates. By coöperation we combine the small lots of many growers and are able to ship in car lots under refrigeration to distant cities. This secured us cheaper rates and higher prices. We cannot afford to ship by express to distant markets, for two reasons: First, the charges are prohibitive, and, second, the berries will not stand up and reach the market in good condition in heated express-cars. Besides, fruit shipped by express is sometimes very roughly handled. Expressmen have been known to pitch crates of fruit about in reckless fashion, breaking the crates, smashing the fruit, and swearing at the wreck. But in a refrigerator-car the crates are slatted and nailed, staunchly braced, well iced and ventilated, and in such condition can be shipped across the continent to the best markets in the land. Thus through coöperation in car-lot shipments rates are cheaper, temperature lower, the handling decidedly better, distant markets can be reached, fruit arrives in better condition and higher prices are secured. Apple growers are not so much benefited by refrigeration as berry growers, but even they are benefited by the reduction of rates in car-lot shipments, in the better handling, and in the better prices of the distant markets.

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We have secured better shipping facilities and better railway service through organization. We have two railroads at our place. They both have lines to Kansas City, our great distributing center, one direct and the other indirect. We do business with both roads. The rates are the same, but the service is different. While there is no competition between the roads, no cutting of rates, they both solicit our business. They can well afford to solicit it, for some years it is equivalent in profits to the railroads to the hauling of 500 cars of lumber, and it is all done in less than thirty days. While we do business with both roads, the bulk of it is done with one, because it is more accommodating than the other. It has built for us, with a little of our help, a loading shed nearly 200 feet long, at which five cars can be loaded at a time. It gives our cars in transit more attention than the other. It keeps its promises to us better. It pays our claims more promptly and fully. It treats us with more courtesy and consideration. It tries to rush our berries to market with all possible expedition. At our solicitation it put on a special strawberry train. That train begins to pick up cars in Arkansas and closes up with our station at midnight. Then it heads for Kansas City, our great distributing center. There it hitches on to a fast Armour meat-train, which hauls our fruit to Minneapolis and other northern cities twenty-four hours quicker than the old way. That quick handling of our strawberries has been a great help to our association. It has put our fruit in the market in better condition and has given us the advantage of an earlier and higher sale. In many sections of the country other roads have put on special trains to haul strawberries, peaches, apples, oranges and other fruit. Even passenger-trains have been sidetracked to give these fruit-trains the right of way. This service has been highly beneficial to the growers everywhere, and these results could not have been obtained but by concerted action.

One of the most serious problems that confronts the fruit grower is that of transportation. This is particularly true of those who, on a large scale, handle fruit that must be marketed quickly or sent long distances. It sometimes amounts to vexation, agitation, exasperation and vituperation, all in one: Railroads fail to supply cars when needed, and thousands of bushels of fruit perish at the station. Cars are delayed in transit and not reiced, and the fruit perishes on the way. Fruit is hauled from non-competing points, and disproportionate charges are made. Fruit is discriminated against everywhere, and exhorbitant rates are established. Almost every article of commerce of equivalent value is hauled cheaper than fruit, and some of it five times as cheap. In some instances the roads get more for hauling the fruit than the growers get for the fruit itself at the loading station. It costs as much to ship apples from north Missouri to central Iowa as it does from New York to Iowa. It costs as much to ship apples from south Missouri to Texas as it does from New York to Texas. It costs as much to ship a car of fruit from Monett, Mo., to St. Louis as it does from Hood River, Ore., to St. Louis, although the distance from Hood River is eight times as great. It costs twenty cents a hundred to ship a car of meat from Omaha to Chicago; it costs forty-five cents a hundred to ship a car of grapes from Omaha to Chicago. It costs fifteen dollars to ice a car of meat from Chicago to Los Angeles, Cal.; it costs sixty dollars to ice a car of fruit from Los Angeles to Chicago. Transportation rates throughout the country are unequal, unfair, and unjust.

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Do the fruit growers have any grievance over these matters? And how can they get redress? The best way to seek adjustment is to do it in an organized way. The peach growers of Georgia organized and went after the railroads through the legislature, and brought them to terms. The Armour Company paid the growers in full for their lost fruit, and the roads agreed to furnish cars in the future when needed, or pay for the fruit, and besides a forfeit of fifty dollars a car. I am glad to note that the Western Fruit-jobbers' Association and the Ozark Fruit-growers' Association, in a sensible way, and the only practical way, are taking up the matter of transportation rates with the Interstate Commerce Commission. They expect to lay the facts before the commission, and they seek the coöperation of fruit and vegetable associations throughout the country in gathering facts. Now if such organizations would act promptly and energetically, and respond to the jobbers' associations with such facts as they may know, there would be some hope of relief; there would be some promise of securing fairer and more consistent transportation rates.

I pass now to consideration of matters which some may think are not relevant to the subject in hand. Directly they are not; indirectly they are. In days agone a celebrated cook-book contained a receipt for cooking a hare. In the introduction the author said, "First catch the hare." Catching and cooking are closely enough related to be included in the same receipt for cooking a hare. So growing and selling fruit are closely enough related to be included in the same receipt for selling fruit. Through organization growers are stimulated to adopt better cultural methods for the production of their fruit. In our association, after the routine business is disposed of, we are in the habit of discussing some phase of fruit culture. We hold experience meetings, in which we relate our ways of doing things, our successes and our failures. We have a kind of correspondence school, in which the aged teach the young; in which the initiated instruct the aspiring; in which the veteran guides the new recruit. The most experienced and successful growers are called upon to tell how they prepare their fields for planting new beds; how they plant; how they cultivate; how they thin; how they renew an old bed; how they produce fancy fruit, like true Missourians. They tell all these things and show how they do them, and thus we learn the better ways from one another. Besides, we visit one another at different seasons of the year, look over one another's fields, and study one another's methods. When we know a grower has a particularly good field and that he has marketed a specially fine crop of particularly good berries, we go to his field to see what he has done and how he has done it.

In this way we catch on. When we come in contact with a patient who is breaking out with a pronounced case of measles we catch the disease and have a spell of it ourselves. So when we come in contact with a man who is breaking out with a pronounced success in growing fruit, due to good cultural methods, we catch the good health, adopt the better method, improve our own ways, and produce better fruit. The best orchardist in my locality, the one that grows the most good fruit per acre, whose apples are the nearest perfect, the smoothest, the freest from scab and rot and codling-moth, who sells his crop the soonest and for the best prices, is a man whose cultural methods are the best. He gives his orchard the closest attention. He works in it by day; he sits up with it by night; he sprays it

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thoroughly; he prunes it scientifically; he cultivates it intensively; he applies commercial fertilizers and barn-yard manure abundantly; he grows leguminous crops in it occasionally. His packing of his orchard product is no better than some others. His working out of that product is more progressive, more intensive, more scientific and more successful. The moral to this story is, be at pains to grow good fruit, and that in turn will grow a good price. "Whoso looketh into the perfect law of fruit culture and continueth therein, he being not a forgetful hearer, but a doer of the work, this man shall be blessed in the market." Good fruit will always sell, and generally it will sell readily and at the highest price. It's the sorry fruit that slumps the market and sells slowly, that disgusts the consumer, that exasperates the commission merchant, and disappoints the producer.

This leads me to say that organization stimulates the growers to do better grading and packing. If there is any one thing we give more emphasis to than another in our association it is this: that we should be very careful and painstaking in grading and packing our berries. We print rules for our pickers and packers, and tack them up, on and in the packing-sheds, to teach them how to do the work. In the association, the growers themselves are instructed upon this subject. In the farm sheds, the growers give this matter their personal attention, or commit it into careful hands who do the work faithfully and well. Inspectors are sent out by the association to the fields to see how the work is done by the individual growers, and to show them how and where to make improvements in their packing. We do not send a teacher to show the growers how to set out their plants, how to cultivate, how to hoe when their fields are weedy, how to thin when their plants are too thick, nor how to mulch to keep their berries clean. From reading and observation, from original thinking and practice, they learn how to do all these things, and they do them just as they please. But we do send a teacher to the farm packing-sheds to instruct the growers how to pack their fruit, and they must pack it to please the management. And further, inspectors at the loading station open every crate, and if the berries do not meet the requirements of the pack they are set aside and not shipped. These things cause the growers to be very careful to pack their fruit well, so that it will bear the most rigid inspection. In this way we get practically a uniform pack, so nearly alike in fact that a stranger at the loading station seeing the fruit come in from 140 farms might think it all came from the same farm.

In this way we put a pack upon the market in 1906 which enabled us to get the highest average price of all the berry associations in Missouri and Arkansas which shipped as many car-loads as we, or whose shipping period was coextensive with ours, and this year we got thirty-two cents per crate higher. We have a commission house in Denver, Colo., which has handled our fruit for years. It is one of the most celebrated in the West. One year at the close of the berry season they wrote us, saying: "Your berry is second to but one—the Hood River berry, the best berry in the world." One year later, after having had another year's experience in handling our berry, after becoming a little better acquainted with it, they wrote us again, saying: "Your berry is the equal of the Hood River berry." One more year later, after having still another year's experience in handling our berry, after noting its size, after seeing its beauty, after testing its quality, after demonstrating its salability, they wrote us once more, saying: "Your berry

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is the superior of the Hood River berry, which we had thought was the best berry in the world." We are proud of this record. It is not only complimentary of our work, it gets us the money. After the close of our berry season this year, I asked our commission house at Kansas City how our berries compared with the berries from other shipping points. They said: "You are not so far ahead of us as you used to be." I asked them how that came about. They replied: "You have taught the southern associations what berry to grow and how to do better packing, and they are catching up with you." Yes, the southern growers are getting better prices, because they have been stimulated to grow better fruit and to do better grading and packing.

Another illustration of what can be accomplished by high-class work in packing is the Hood River Apple-growers' Union. The growers of that Union do not pack their own fruit. It is packed by the Union The Union employs expert packers and one expert is placed with every orchard crew. That crew works under his direction. In this way they get a uniform pack. And how do they pack their fruit? They pack it in boxes, not barrels. The boxes are lined with white paper. The apples are nearly uniform in size. Each apple is a perfect specimen. Each apple is wrapped separately in a printed tissue paper. The apples are packed in tiers and rows. A blue layer-paper is placed between every two tiers of apples. The tiers are all alike. The bottom tier is as good as the top one. The middle tier is as good as either top or bottom. A blue layer-paper is laid upon the top, and some of the growers lay upon that a mat with their monogram beautifully printed in letters of gilt. On the ends of the box a label is put—a beautiful label, a work of art, the picture being a reproduction of the Hood River apple, the Spitzenburg, in size, color, and shape. The sight of that picture makes one's mouth water, till he imagines he scents the fragrant aroma and tastes the delicious flavor of that prince of western fruit. No marvel, if they pack apples in that style, that they get calls for them in Klondyke, in New York, in Vladivostock, and that they get prices that are the wonder of the world. In 1902, before their organization, the individual growers sold Spitzenburgs for 85 cents per box. In 1903, the first year after their organization, the Union sold Spitzenburgs for $2 per box; and every year since they have raised the price, until 1907, when they sold their crop of Spitzenburgs for $3.27½ per box, equivalent to $9.82½ per barrel. At the rate they are now going, if not providentially hindered, in 1910 they will be riding in automobiles and distributing their apples at $5 per box, or 10 cents a smell. They attribute their high-class packing and their astonishing prices to their organization.

I do not say that all apples should be packed in this way and sold for these prices; in fact, I am glad they are not. If they were the common people would be expelled from the garden of economy for eating such forbidden fruit and banished to the cheerless realms of millionaires. I would prefer that Ben Davis apples should be so perfectly grown and so well packed that they would sell readily for three dollars per barrel and be so plentiful that the children in the cities and the hogs in the country could get some to eat—if they could put up with the quality. What I wish to emphasize is that good, honest packing will pay the grower every time.

Another advantage of organization is specialization. I believe in specialism. The association I represent believes in it. There are several berry

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associations in Missouri and apple associations in Oregon that believe in it. Jesus Christ himself was a specialist. He said: "To this end was I born, and for this cause came I into the world, that I should bear witness unto the truth." Paul, the great apostle to the Gentiles, was a specialist. He said: "This one thing I do." Five years ago we grew a dozen different commercial varieties of strawberries. One of our growers experimented with thirty-six varieties; but we found it confusing to the pickers. They did not all ripen at the same time. They were of different sizes, different shapes, different colors, different carrying qualities, and had to be picked in different ways. It was hard to teach the pickers how to properly pick the different varieties. It was a hard lesson. It was difficult for the packers and inspectors. It was very troublesome to the salesmen who sold the fruit in the cars.

So the force of these circumstances drove us to the selection of one variety of berries, the one best adapted to our soil and climate, and which we can grow to the highest degree of perfection, and to give almost our entire attention to the production of that variety. We have practically made our reputation on that one variety. Hood River, Ore., made its reputation on Clark's Seedling; Logan, Mo., made its reputation on the Gandy; Van Buren, Ark., made its reputation on Mitchell's Early; and Neosho, Mo., made its reputation on the Aroma. All these made such reputations as they have by being specialists. There are many stock-breeders throughout the country who have achieved great success by giving their entire attention to the growing of one kind of stock, such as Percheron horses, Durham cattle, Duroc-Jersey hogs, and Plymouth Rock chickens. I would not limit orchardists to one variety of apples or peaches, but I would limit them in commercial growing to a very few popular varieties, and to such varieties as are best adapted to their soils, climates, and locations. It is much easier for an organization to handle one variety of good fruit than a dozen of common fruit. On this account the tendency of organization is to specialization.

There is one great problem in the fruit business which organization is slowly working out and which it will eventually solve, and that is of disposing of our unmarketable fruit—our culls, our windfalls, our left-overs, our immature and rotten fruit—much of which at present is lost. In my neighborhood, in 1906, one orchardist lost 3000 bushels of refuse apples. They lay upon the ground and rotted. Another lost 2000 bushels. So it goes all over the country. What shall be done or what can be done with this class of fruit? "Gather up the fragments, that nothing be lost." Learn a lesson if you will from the great packing establishments of the land. We send to them many thousands of cattle and hogs every year. At home, in butchering them we throw away the hoofs and hair. We throw away the head and horns. We throw away the offal—the entrails and the bones. But at the packing-house they throw nothing away—they utilize everything, except, possibly, the squeal; and some of these days some Yankee will find some way of saving that and throwing it upon the market as rag-time music. They put everything through a process of some kind, convert it into a by-product of some sort, put it upon the market somewhere, and sell it at a profit. That is the result of organization and the application of good business principles to their enterprise. Fruit growers need to organize in their several localities and build canning factories, evaporators, cider-presses, vinegar plants, fruit-juice and butter factories, cold storages,

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ice plants, warehouses, and plants for the distillation of denatured alcohol. They need to pack their No. 1 and No. 2 apples for storage and market, and all other grades they need to bring to these plants, convert them into desirable by-products of some kind, put them upon a craving market and sell them at a profit. In this way we too can "Gather up the fragments, that nothing be lost."

These things are coming. They have already reached some localities. Just here I want to take off my hat to the enterprising fruit growers of Arkansas. Did you ever hear about Arkansas? They do not have as many level acres of wheat land as you do in the windy state of Kansas; they do not have as many fine mules as we do in the uplands of Missouri; they cannot grow as many bushels of corn per acre as they can in the black lands of Iowa; they do not raise as many blooded and pedigreed hogs as they do in the rich lands of Illinois; they do not have as many fine graded schools as they do in the cultured state of Indiana. But they do have a rising generation of progressive fruit growers, and they are leading the horticulturists of all those states in the matter of saving the wastes of the orchard. They have organized and installed many plants for the manufacture of various kinds of fruit products. Here they take their inferior grades of fruit and make them up into useful commodities. They keep these grades off the market, and that prevents gluts and gives them a better price for their better grades of packed fruit. In time they will put these manufactured products upon the market and get valuable returns. Yes, these things are coming. We await their general arrival with a great deal of hope. We look to organization to work out this problem, and, when it is wrought out, and it must be, then the millennium of fruit growing will be at hand; then commercial orcharding and general fruit growing will be less wasteful and more profitable.

In conclusion, let us not lay again the foundation of individualism, of separatism, of every man for himself and his majesty after us all; but, joining hands with our neighbors, let us adopt better cultural methods for the production of fancy fruit, better protective measures for its defense against its natural enemies, and, applying better business methods to save the wastes and prepare the perfect product for a profitable market, let us go on towards perfection in growing and marketing the golden products of the orchard and field. Forgetting the things that are behind—the bad seasons and the worse management—and reaching forth unto the things that are before—good seasons, better business principles and the best of markets—let us press steadily forward towards the high-water mark, for the prize of the high calling of God in the delightful and ennobling science of horticulture.

DISCUSSION ON MR. GRAVES'S PAPER.

MR. BESLY: Mr. Graves says they combine to regulate the price of labor. How do they escape the laws against combination?

MR. GRAVES: I have reference in this to the amount that we pay our pickers for picking a box of strawberries, and that we pay them one and one-half cents for doing that. The object we have in doing that is to avoid confusion. It confuses pickers and it confuses growers to have a variety of prices for that particular work; but, while we establish that price, we pay our help more than they could get at anything else for that class of

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labor, and consequently if we pay them a higher price than they can get at anything else they are not likely to bring the law down on us.

MR. BESLY: Then the answer is, so far the lightning has not struck you.

MR. GRAVES: Has not struck us.

KANSAS WEATHER FOR 1907.

As reported by United States Weather Bureau, T. B. JENNINGS, Section Director, Topeka.

GENERAL SUMMARY.

The year 1907, as a whole, was somewhat warmer and drier than usual, though some of the monthly departures from the normal temperature were the greatest on record. The opening month of spring was remarkably warm; indeed, it was the warmest March on record. The winter was very warm, but the last two months of spring were decidedly cold and backward. The summer temperature was normal, and the autumn slightly warmer than usual.

There was an excess in temperature over the state, except in Marshall and Nemaha counties and in the central northern counties west of Ottawa, Cloud and Republic counties, where there was a slight deficiency. The temperature was more than 3° above normal at Yates Center and more than 1° below normal at Hays.

The last killing frost in the spring occurred in May and was 25 days later than the average in the northwestern and 28 days later in the southeastern portion of the state. The first killing frost in the autumn occurred in some of the northwestern counties on October 8, in the eastern counties on October 13, and over the rest of the state on the 2d, 9th or 11th of November, and was from 7 to 12 days earlier than usual in the eastern counties, 12 days later than usual in the northwestern counties, and 20 to 30 days later than usual over the rest of the state.

Precipitation in excess of the normal occurred in the southern and a few of the central counties, but was deficient in the other counties. June was the wetest month and November the dryest. The preciptation for the winter was slightly above normal. It was more than an inch below normal in the spring, but was somewhat above normal for the summer and autumn. It was much below normal during the four consecutive months, February to May. The snowfall was heaviest in the western and northern counties and least in Chautauqua and Cowley counties. Measurable snow fell in seven of the twelve months. The greatest monthly snowfall during the first half of the year occurred in April and the greatest for the year in December. No snowfall was recorded in the state during June, July or August.

TEMPERATURE.—The annual mean, 54.9°, was 0.7° above the normal. The highest local annual mean was 58.2° at Oswego. The lowest local annual mean was 51.6° at Harrison and at Norton. The highest temperature recorded during the year was 109° at Alton on August 10. The lowest temperature recorded during the year was 12° below zero at Republic on December 17 and at Harrison on December 19. The range for the state was 121°.

PRECIPITATION.—The average for the state, 27.77 inches, was 1.21 inches below the normal. The greatest local amount was 44.47 inches at Paola.

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The least local amount was 8.85 inches at Wallace. The average number of days with .01 of an inch or more was 74. The average snowfall for the state was 13.1 inches.

SUNSHINE AND CLOUDINESS.—The prevailing wind was from the south. There was an average of 181 clear days, 94 partly cloudy and 90 cloudy days.

THE WEATHER BY MONTHS.

January averaged somewhat milder than usual, with no cold waves during the first two decades and but one in the last. The temperature was deficient in the northwest portion of the state and above normal over the rest of the state. The precipitation was the greatest on record for January, nevertheless there was a slight deficiency in the extreme western and northwestern counties. The month was unusually cloudy.

February was unusually mild, though a cold wave occurred on the 2d and the Kansas river remained frozen from the 3d to the 8th. The temperature was above normal at all stations, the greatest departures occurring in the western portion of the state. The precipitation was below normal. There was an excess in the central counties, but it was deficient over the rest of the state. An aurora was observed on the 9th, and also in the eastern counties on the 10th. There was more sunshine than usual.

March was very warm and dry. The mean temperature averaged more than 10° above normal. The maximum temperature, also, was the highest recorded in the state in March, and hot winds were reported on the 21st. Though the precipitation for the state was deficient, there was a slight excess in a few central and eastern counties. On the 9th and 10th snow fell in the northern portion of the state from less than an inch up to nine inches in depth. The precipitation generally occurred on the 9th and 10th and on the last four days. There was an excess of sunshine.

April was unusually cold and dry; in fact it was not only the coldest month of the spring, but was also the coldest April on record. The mean temperature was below the normal at all stations, the greatest deficiencies occurring in the central counties and the least at Wallace. There was an excess of precipitation in a few extreme southeastern counties, but it was deficient over the rest of the state. In many of the central counties the deficiency was more than two inches. The snowfall was more than four inches in the extreme northeastern counties, and from six to twelve inches in the extreme southeastern.

May was cold and dry; indeed, it was the coldest May on record. The mean temperature was more than 6° below normal, and the minimum temperature of 17° has been reached only in 1893. The temperature was deficient at all stations, ranging from 4° below normal in the northwestern counties to 9° below in the southeastern. In but four years has May been drier. The precipitation averaged 1.90 inches below normal, the greatest deficiencies occurring in the northeastern counties, while a slight excess occurred in a few southwestern counties and in Cherokee county. On the 3d from one to four inches of snow fell throughout the northern half of the state. The killing frost in the central and western counties on the 27th was the latest ever recorded in the state.

June was cooler than usual. There was an excess in temperature in many of the northwestern counties, but over the rest of the state the temperature was deficient, the greatest deficiency occurring in the extreme

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southwestern counties. The precipitation for the state was slightly above normal. Precipitation in excess of the normal occurred in all of the southern counties except Comanche and Barber counties; it was also above normal in the west central and east central counties and in the extreme northeastern. Elsewhere the precipitation was deficient. The amount of sunshine was slightly above normal.

July averaged somewhat warmer than usual. The temperature was above normal over the entire state, except in the southern counties west of Cowley and Sedgwick counties. It was more than 3° in excess in Finney and Osborne counties and more than 4° in Smith county, while the deficiency in the extreme southern counties was generally less than 1°. Though the rainfall for the state was slightly above normal, it was quite deficient in the southeastern counties and in the central northern counties, being more than three inches below normal in the former and four inches in the latter. There was an excess of more than four inches in the central southern counties and in Kearny and Russell counties, and more than six inches in Ellis county. The sunshine was above normal.

August was a warm month. The 9th and 10th were unusually hot days, and temperatures of over 100° were common. The temperature was below normal in the extreme southwestern and west central counties, but above normal over the rest of the state. There was a deficiency of more than 2° in the extreme southwest, and an excess of more than 2° in the central northern and extreme southeastern portions of the state. The rainfall was in excess in the southern, central and northwestern counties, but deficient in the other counties. The precipitation was fairly well distributed through the month, and there was a marked excess of cloudy days.

September was warm and dry. The temperature was below normal in the extreme northeastern and central eastern counties, but above normal in the other counties. It was more than 1° below normal at Frankfort and more than 2° above normal in the central southern counties, and more than 3° above at Hoxie. There was an excess of precipitation in the extreme northern and a few southwestern counties, but in the other counties it was deficient. The greatest excess occurred at Concordia, and the greatest deficiency in the southeastern counties. There was an excess of sunshine.

October was moderate in temperature, with an excess in precipitation. The temperature was below normal from Smith and Jewell counties to the southeast corner of the state. It was also below normal in the extreme northeastern and extreme southern counties, but above normal in the other counties. There was an excess of 2° in the extreme western counties and a deficiency of 2° in Linn county. There was a deficiency of precipitation in the extreme western counties, which extended eastward into Jewell county and thence southward into the north central counties. In the other counties the precipitation was above normal. The greatest excess occurred in Woodson county and the greatest deficiency in Norton county. There was a normal amount of sunshine.

The temperature during November was moderate and the precipitation deficient. There was an excess of temperature in the northeastern counties, the central southern counties, the extreme northwestern counties, and Barton, Cloud and Smith counties. In the other counties it was deficient. The greatest excess occurred in Kingman county, and the greatest deficiency in Norton and Republic counties. The precipitation was above normal in the

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northeastern and southeastern counties and deficient elsewhere. The greatest excess occurred in Crawford county and the greatest deficiency in Republic county. A light snow fell in the west portion of the state on the 10th and a trace of snow over the rest of the state on the 11th. A marked feature was the large number of clear days.

December was warm and wet. The temperature was deficient in the northwestern counties and above normal elsewhere, the greatest excess occurring in the southeastern counties and the greatest deficiency in Norton county. The precipitation was below normal in the extreme eastern counties and above normal in the other counties, the greatest departures being 1.33 inches below normal at Atchison and 2.74 inches in excess at Anthony. The snowfall was unusually heavy; it was heavier in the western than in the eastern counties, and heaviest at Garden City. The month was deficient in sunshine.

KILLING FROSTS, 1907.

STATIONS.	Last in spring.	First in autumn.	STATIONS.	Last in spring.	First in autumn.
Eastern division.			*Middle div.—concluded.*		
Agricultural College	May 27	Oct. 8	Hanover	May 27	Oct. 13
Atchison	May 15	Oct. 13	Harrison	May 27	Oct. 13
Baker	May 15	Oct. 13	Hays	May 27	Nov. 2
Burlington	May 4	Oct. 13	Hutchinson	May 15	Nov. 10
Columbus	May 4	Oct. 13	Jewell	May 27	Oct. 13
Cottonwood Falls	May 27	Oct. 13	La Crosse	May 27	Nov. 11
Emporia	May 27	Oct. 13	Larned	May 27	Nov. 3
Eskridge	May 4	Oct 28	Lebanon	May 27	Nov. 10
Eureka	May 15	Oct. 13	Macksville	May 27	Nov. 10
Fall River	May 15	Oct. 13	McPherson	May 27	Oct. 28
Fort Scott	May 4	Oct. 13	Minneapolis	May 27	Oct. 13
Frankfort	May 27	Oct. 8	Mount Hope	May 15	Nov. 10
Garnett	May 4	Oct. 13	Newton	.....	Nov. 9
Grenola	May 15	Oct. 28	Norwich	May 15	Nov. 11
Horton	May 15	Oct. 12	Phillipsburg	May 27	Nov. 10
Howard	May 15	Oct. 27	Plainville	May 27	Nov. 10
Independence	May 4	Oct. 13	Pratt	May 25	Nov. 10
Iola	May 4	Oct. 18	Republic	May 15	Oct. 13
Kansas City, Mo.	May 4	Oct. 13	Rome	May 15	Nov. 11
Lebo	May 4	Oct. 13	Russell	May 27	Nov. 2
Madison	May 4	Oct. 13	Salina	May 27	Oct. 28
Manhattan	May 27	Oct. 13	Wichita	May 15	Oct. 28
Moran	May 4	Oct. 13	Winfield	May 15	Oct. 28
Olathe	May 4	Oct. 13	*Western division.*		
Osage City	May 4	Oct. 13	Ashland	May 27	Nov. 11
Oswego	May 4	Oct. 13	Cimarron	May 27	Nov. 10
Ottawa	May 4	Oct. 13	Colby	May 27	Nov. 2
Paola	May 4	Oct. 28	Coolidge	May 27	Oct. 28
Pleasanton	May 4	Oct. 13	Dodge City	May 27	Nov. 9
Sedan	May 4	Oct. 27	Dresden	May 27	Oct. 18
Topeka	May 4	Oct. 28	Farnsworth	May 27	Nov. 2
Toronto	May 15	Oct. 13	Garden City	May 27	Oct. 10
Valley Falls	May 15	Oct. 12	Goodland	May 27	Oct. 12
Walnut	May 4	Oct. 28	Gove	May 27	Oct. 8
Yates Center	May 4	Oct. 13	Hill City	May 27	Oct. 13
Middle division.			Hoxie	May 27	Nov. 2
Alton	May 27	.....	Hugoton	May 27	.....
Anthony	May 15	Nov. 11	Jetmore	May 27	Oct. 8
Chapman	May 27	Oct. 13	Lakin	May 27	Oct. 8
Clay Center	May 27	Oct. 13	Liberal	May 27	Nov. 11
Coldwater	May 15	Nov. 11	Ness City	May 27	.....
Concordia	May 15	Oct. 13	Norton	May 27	Nov. 2
Cunningham	May 27	Nov. 9	Oberlin	May 27	Nov. 2
El Dorado	May 15	Oct. 28	Scott	May 27	Oct. 8
Ellinwood	May 27	Nov. 2	Ulysses	May 27	Nov. 9
Ellsworth	May 27	Oct. 28	Wa Keeney	May 27	Oct. 8
Enterprise	May 28	Oct. 13	Wallace	May 27	Oct. 8
Greensburg	May 27	Nov. 11			

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PRECIPITATION FOR TWENTY-ONE YEARS.

YEAR.	Eastern division.....	Middle division.....	Western division.....	State	Monthly Maximum...	Month .....
1887	27.22	25.25	20.28	23.07	4.34	Aug.
1888	34.12	20.84	18.62	24.17	4.39	Aug.
1889	37.01	32.52	19.51	29.47	5.48	May.
1890	31.79	23.58	14.33	20.65	4.06	Aug.
1891	34.00	32.79	29.21	30.90	6.28	June.
1892	39.63	27.78	17.98	29.06	6.90	May.
1893	30.23	18.58	11.98	20.12	3.91	June.
1894	28.76	21.25	12.19	20.72	4.94	June.
1895	37.99	24.88	21.39	27.86	5.58	July.
1896	35.77	30.82	19.58	29.26	4.75	May. July.
1897	27.56	22.91	22.91	24.58	3.69	Apr.
1898	42.72	29.39	22.13	32.35	6.28	May.
1899	33.20	27.98	18.11	28.01	5.58	June.
1900	37.61	27.39	18.51	29.65	6.37	Sept.
1901	26.00	20.89	17.91	22.15	3.64	Apr.
1902	45.71	34.30	22.24	35.50	6.64	May.
1903	41.88	32.41	19.78	33.46	8.57	May.
1904	41.72	30.11	21.22	32.86	7.04	June.
1905	39.85	29.53	22.94	32.09	5.55	July.
1906	34.00	28.65	23.16	29.48	4.65	July.
1907	35.67	25.88	17.83	27.77	5.02	June.
Average of the twenty-one years..	35.35	27.03	19.61	27.77	8.57	May.

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TEMPERATURE AND PRECIPITATION, 1907.

STATIONS.	Temperature (degrees Fahrenheit).					Precipitation (inches).				
	Annual mean.....	Highest.....	Date.....	Lowest.....	Date.....	Total for the year..	Greatest monthly..	Month.....	Least monthly..	Month.....
Eastern division.										
Agricultural College,	53.8	101	Aug. 9	— 4	*Feb. 4	28.47	6.46	July	1.05	May
Atchison	54.0	99	*July 24	— 8	Feb. 5	28.86	5.20	July	0.24	Dec.
Baker	.....	97	Aug. 18	—11	Feb. 5	31.52	7.73	June	0.81	Dec.
Burlington	56.8	105	Aug. 9	0	Feb. 5	31.89	5.39	June	0.84	Feb.
Columbus	57.5	103	Aug. 11	4	Feb. 6	40.66	6.26	June	0.79	Feb.
Cottonwood Falls	55.7	105	Aug. 10	— 7	Feb. 4	31.12	8.03	May	0.65	Apr.
Emporia	55.5	105	Aug. 10	— 4	Feb. 4	35.33	5.20	June	0.79	Apr.
Eskridge	.....	101	July 25	— 5	*Feb. 4	.....	6.25	June	0.84	Nov.
Eureka	.....	.....	.....	.....	.....	32.79	4.84	June	1.20	Mar.
Fall River	57.4	105	*Aug. 9	3	*Feb. 5	39.83	6.43	Jan.	0.87	Sept.
Fort Scott	56.4	104	Aug. 11	0	Feb. 6	38.93	6.97	June	0.81	Feb.
Frankfort	53.3	105	July 24	— 9	Feb. 5	24.84	3.80	June	0.83	Dec.
Garnett	56.2	99	Aug. 10	— 2	*Feb. 5	41.45	6.74	Jan.	0.68	Dec.
Grenola	56.4	102	*Aug. 9	3	Feb. 5	40.30	9.34	June	0.64	Sept.
Horton	52.8	99	*July 23	— 9	Feb. 5	32.81	8.94	June	0.62	Dec.
Howard	.....	104	*Aug. 9	.....	.....	.....	12.59	June	1.45	Nov.
Independence	.....	105	Aug. 9	7	*Feb. 5	38.27	5.96	June	0.50	Feb.
Iola	56.2	101	Aug. 9	2	Feb. 5	36.70	6.11	Jan.	0.41	Feb.
Kansas City, Mo.	54.7	98	July 25	— 5	Feb. 5	37.59	7.53	July	0.91	Feb.
Lawrence	54.3	98	July 25	— 2	Feb. 5	36.17	7.42	June	0.72	Dec.
Lebo	55.2	103	*Aug. 9	— 6	Feb. 4	32.67	4.91	June	0.96	Apr.
Madison	.....	105	Aug. 9	.....	.....	36.72	6.91	June	1.25	Mar.
Manhattan	53.8	104	July 25	— 3	Feb. 6	29.11	6.45	June	0.90	Feb.
Moran	56.9	102	*Aug. 9	1	Feb. 6	37.55	5.94	June	0.02	Feb.
Neosho Rapids	.....	.....	.....	.....	.....	32.47	4.91	June	0.91	Apr.
Olathe	.....	97	*July 24	— 8	Feb. 6	38.08	6.80	June	0.71	Feb.
Osage City	.....	103	Aug. 9	— 6	Feb. 5	35.52	9.17	June	0.82	Dec.
Oswego	58.2	104	Aug. 8	4	Feb. 6	36.74	6.56	June	0.36	Feb.
Ottawa	54.5	101	*July 25	— 8	Feb. 6	34.75	7.18	June	0.64	Dec.
Paola	55.0	101	July 25	— 6	Feb. 6	44.47	7.87	June	1.04	Sept.
Pleasanton	55.8	100	*Aug. 9	— 5	Feb. 6	41.91	7.43	June	0.60	Feb.
Sedan	.....	102	*Aug. 9	6	Feb. 6	.....	7.51	June	0.30	Feb.
Topeka	54.3	100	July 24	— 4	Feb. 4	27.49	4.89	June	0.60	Dec.
Toronto	.....	106	Aug. 9	— 1	Feb. 5	39.87	7.05	Jan.	0.67	Sept.
Valley Falls	53.4	96	*July 7	— 9	Feb. 5	30.63	7.65	July	0.48	Dec.
Walnut	57.4	106	Aug. 11	3	*Feb. 5	43.95	7.20	June	0.28	Feb.
Yates Center	57.3	101	*Aug. 9	— 1	Jan. 27	.....	7.16	Jan.	1.08	Feb.
For the division..	55.5	106	*Aug. 9	—11	Feb. 5	35.67	12.59	June	0.02	Feb.
Middle division.										
Abilene	.....	.....	.....	.....	.....	29.68	6.02	June	0.94	Apr.
Alton	.....	109	Aug. 10	— 4	Jan. 27	.....	4.48	June	0.20	Oct.
Anthony	.....	101	Sep. 7	4	Feb. 4	34.34	7.39	July	0.55	Sept.
Chapman	.....	104	*Aug. 9	— 4	Feb. 4	.....	5.34	June	0.70	Apr.
Clay Center	54.1	106	July 24	— 5	Dec. 19	22.08	4.40	June	0.75	Nov.
Coldwater	56.9	102	July 25	— 1	Feb. 4	20.34	6.20	July	0.04	Mar.
Concordia	53.4	102	July 24	— 3	Feb. 5	24.05	5.91	July	0.21	Nov.
Cunningham	57.2	105	Aug. 19	— 1	Feb. 4	30.48	9.32	July	0.45	A
El Dorado	56.5	102	Aug. 9	1	*Feb. 4	31.78	4.32	June	0.92	Mar.
Ellinwood	54.7	101	July 25	— 3	*Feb. 4	26.58	5.63	July	0.18	Nov.
Ellsworth	54.2	103	*Aug. 9	— 7	Jan. 26	20.88	4.22	Sept.	0.18	Nov.
Enterprise	55.3	107	Aug. 9	— 4	*Feb. 4	26.73	5.53	June	0.69	Nov.
Greensburg	55.6	101	July 25	— 2	Feb. 4	.....	5.85	July	T.	Nov.
Hanover	53.4	104	*July 23	— 8	Feb. 5	27.59	4.16	June	0.60	Mar.
Harrison	51.6	106	Aug. 10	—12	Dec. 19	20.96	4.86	Sept.	0.17	Nov.
Hays	52.8	104	Aug. 10	— 6	Dec. 19	25.40	9.15	July	0.11	Nov.
Hutchinson	55.6	102	Aug. 9	— 5	Feb. 5	24.56	4.77	July	0.48	Mar.
Jewell	.....	105	*Aug. 10	—10	Dec. 19	18.97	4.21	June	0.13	Nov.
La Crosse	.....	103	Aug. 10	— 7	Feb. 5	22.52	5.88	July	0.29	Feb.
Larned	.....	100	June 14	— 6	Feb. 5	28.82	7.62	June	0.14	Feb.
Lebanon	.....	107	Aug. 10	— 6	Feb. 3	.....	.....	.....	T.	July
Macksville	54.2	100	June 14	— 3	*Feb. 4	24.76	7.85	July	T.	Nov.
McPherson	55.0	106	Aug. 10	— 3	Feb. 4	30.13	4.95	Aug.	0.62	Nov.
Minneapolis	53.6	103	July 24	— 3	*Feb. 4	24.81	5.79	June	0.36	Nov.
Mount Hope	.....	.....	.....	.....	.....	.....	5.99	Aug.	0.29	Mar.
Newton	.....	105	Aug. 10	— 4	Feb. 4	.....	4.57	Aug.	0.46	Mar.
Norwich	.....	101	Aug. 15	0	Feb. 4	28.93	4.92	June	0.44	Mar.

*On other dates also. A=April and November. T=Trace.

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TEMPERATURE AND PRECIPITATION—CONCLUDED.

STATIONS.	Temperature (degrees Fahrenheit).					Precipitation (inches).				
	Annual mean.....	Highest.....	Date.....	Lowest.....	Date.....	Total for the year..	Greatest monthly..	Month.....	Least monthly..	Month.....
Middle division.										
Phillipsburg	.....	109	Aug. 10	— 7	Dec. 19	.....	6.30	June	0.18	Nov.
Plainville	.....	101	Aug. 10	— 5	Feb. 3	.....	5.90	June	0.11	Oct.
Pratt	.....	100	Aug. 10	— 2	Feb. 4	.....	6.25	July	0.05	Mar.
Republic	.....	101	July 8	—12	Dec. 17	25.38	4.40	Sept.	0.10	Nov.
Rome	57.5	105	Aug. 11	4	Feb. 5	34.90	5.04	June	0.51	Mar.
Russell	53.5	101	*Aug. 10	— 5	Dec. 18	27.86	7.72	June	0.13	Nov.
Salina	55.0	105	Aug. 9	— 3	Dec. 18	23.39	3.65	Sept.	0.28	Nov.
Wichita	56.6	102	Aug. 9	0	Feb. 4	31.51	5.80	Aug.	0.79	Nov.
Winfield	57.5	103	Aug. 10	4	Feb. 5	34.87	5.35	June	0.70	Mar.
For the division..	54.8	109	Aug. 10	—12	*Dec. 17	25.88	9.62	July	T.	B
Western division.										
Ashland	57.3	103	July 25	2	Feb. 4	26.23	7.49	July	T.	Feb.
Cimarron	54.4	100	*Aug. 14	— 3	Feb. 4	22.06	7.39	July	0.15	Mar.
Colby	.....	.....	.....	— 5	Feb. 3	12.99	2.67	Aug.	0.09	Feb.
Coolidge	53.8	104	Aug. 10	— 2	Dec. 9	12.58	4.02	July	T.	C
Dodge City	54.6	100	July 25	— 2	Feb. 4	18.26	4.16	June	0.17	Nov.
Dresden	52.5	108	Aug. 10	— 6	Feb. 3	14.24	2.82	June	0.14	Feb.
Farnsworth	53.4	105	July 24	— 3	Feb. 4	15.18	3.58	Aug.	0.16	Feb.
Garden City	55.1	103	*July 24	— 1	Feb. 4	20.95	6.35	July	0.15	Jan.
Goodland	.....	104	Aug. 10	3	*Feb. 6	.....	2.39	July	T.	Feb.
Gove	53.5	106	July 24	3	*Feb. 3	19.80	5.46	June	0.20	Feb.
Hill City	.....	106	Aug. 10	— 3	Feb. 3	.....	5.35	June	.....	.....
Hoxie	.....	103	*July 23	.....	.....	.....	3.44	July	.....	.....
Hugoton	.....	105	*July 24	.....	.....	.....	4.17	June	T.	Nov.
Jetmore	.....	105	Aug. 8	— 4	Feb. 4	19.14	4.99	July	0.15	Nov.
Lakin	.....	104	*July 7	1	Feb. 4	19.82	6.76	July	T.	Feb.
Liberal	.....	105	Aug. 15	.....	.....	.....	6.22	June	.....	.....
Ness City	.....	.....	.....	— 3	Feb. 4	.....	3.74	Aug.	.....	.....
Norton	51.6	107	Aug. 8	—11	Dec. 19	17.30	5.49	June	T.	Feb.
Oberlin	.....	.....	.....	.....	.....	16.34	3.01	Aug.	0.30	D
Scott	54.0	101	July 24	— 2	Feb. 4	19.75	4.32	June	0.16	Nov.
Ulysses	.....	103	Aug. 11	2	Feb. 4	18.74	4.02	June	T.	Mar.
Wa Keeney	53.6	105	Aug. 10	— 5	Feb. 4	20.04	4.95	June	0.17	Nov.
Wa Keeney (near)	.....	.....	.....	.....	.....	19.51	5.01	June	0.25	Nov.
Wallace	52.8	106	July 24	0	*Dec. 20	8.85	2.21	Aug.	T.	Feb.
For the division..	54.0	108	Aug. 10	—11	Dec. 19	17.83	7.49	July	T.	E
For the State	54.9	109	Aug. 10	—12	*Dec. 17	27.77	12.59	June	T.	F

*On other dates also.

B=July and November.

C=February and March.

D=January and November.

E=February, March, and November.

F=February, March, July, and November.

T=Trace.

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HORTICULTURAL STATISTICS.

(On pages following.)

Reports of 1906.

Table I.—Fruit-trees of bearing age.

II.—Fruit-trees not of bearing age.

III.—Acreage and product of small fruits.

IV.—Vineyards, gardens, fruit, vegetables, etc.

V.—Fruit grown in 1905.

VI.—Forestry statistics.

Reports of 1907.

VII.—Fruit-trees of bearing age.

VIII.—Fruit-trees not of bearing age.

IX.—Acreage and product of small fruits.

X.—Vineyards, gardens, fruit, vegetables, etc.

XI.—Fruit grown in 1906.

XII.—Rank of counties.

XIII.—Forestry statistics.

XIV.—Summary of 1906 and 1907.

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HORTICULTURAL STATISTICS, 1906.

Table I.—FRUIT-TREES OF BEARING AGE.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.	Quince.	Apricot.
THE STATE, 1906.....	6,656,144	243,133	4,624,412	633,954	653,301	9,684	190,843
Allen.....	77,980	2,678	26,340	6,065	2,746	159	220
Anderson.....	70,329	2,648	25,340	5,718	3,834	135	277
Atchison.....	111,190	2,158	34,761	4,470	4,523	27	149
Barber.....	19,985	1,090	40,743	4,777	5,513	9	2,321
Barton.....	26,628	1,968	44,276	4,583	10,163	37	1,574
Bourbon.....	91,848	4,576	22,809	8,500	2,607	110	121
Brown.....	139,420	4,463	62,843	14,033	12,580	42	363
Butler.....	137,764	3,617	84,021	8,679	6,352	164	6,898
Chase.....	55,129	1,883	28,222	3,157	3,057	45	1,195
Chautauqua.....	65,027	2,378	30,560	9,653	3,731	114	468
Cherokee.....	129,880	1,440	29,391	11,364	4,441	292	251
Cheyenne.....	787	33	874	2,451	1,894	.....	28
Clark.....	1,769	143	6,670	300	789	15	233
Clay.....	64,474	1,586	64,904	4,275	6,986	29	1,414
Cloud.....	55,967	1,809	81,248	3,154	9,483	9	3,435
Coffey.....	113,722	3,148	38,083	6,907	5,488	145	388
Comanche.....	3,407	241	12,048	1,671	2,728	10	489
Cowley.....	152,785	6,490	90,619	19,865	12,889	343	4,303
Crawford.....	92,560	3,170	17,023	9,414	3,523	98	157
Decatur.....	5,486	414	32,750	3,221	13,055	10	1,016
Dickinson.....	95,311	3,822	94,199	4,760	13,653	177	5,190
Doniphan.....	273,797	8,365	84,995	11,973	9,136	53	431
Douglas.....	114,599	10,953	69,473	9,077	8,483	342	457
Edwards.....	3,917	535	24,994	3,562	4,673	19	540
Elk.....	86,361	3,376	33,863	13,702	5,282	202	484
Ellis.....	2,546	187	3,745	4,400	2,847	8	431
Ellsworth.....	19,785	967	30,987	2,601	6,686	60	1,035
Finney.....	9,332	537	10,483	8,569	4,635	10	256
Ford.....	3,254	224	28,472	3,403	6,499	1	2,929
Franklin.....	103,163	2,770	35,281	4,345	4,331	133	209
Geary.....	34,761	984	21,817	1,517	2,755	15	352
Gove.....	1,449	293	11,599	11,435	2,840	9	341
Graham.....	2,805	197	25,359	5,730	3,811	3	1,172
Grant.....	52	.....	1,946	957	289	1	82
Gray.....	1,163	116	4,265	1,789	1,580	.....	272
Greeley.....	93	10	234	370	241	.....	18
Greenwood.....	128,246	4,615	45,492	12,523	6,785	216	665
Hamilton.....	1,520	207	1,475	1,332	779	.....	10
Harper.....	37,165	2,860	50,194	9,343	9,571	68	3,266
Harvey.....	67,627	4,182	42,958	5,249	6,378	128	6,276
Haskell.....	129	47	2,277	293	184	.....	46
Hodgeman.....	1,513	158	11,081	4,465	3,088	373	623
Jackson.....	101,348	3,018	68,285	7,402	8,822	79	741
Jefferson.....	178,027	7,757	89,639	7,777	9,608	239	479
Jewell.....	84,268	1,618	221,242	8,314	18,625	9	5,855
Johnson.....	78,465	6,330	47,505	5,634	6,458	126	213
Kearny.....	6,508	75	8,687	5,552	1,662	13	495
Kingman.....	33,476	2,486	50,031	7,008	4,845	239	3,023
Kiowa.....	2,647	315	26,408	2,448	2,623	5	515
Labette.....	130,827	5,038	27,565	10,645	4,201	208	241
Lane.....	1,827	167	7,909	7,412	1,884	6	205
Leavenworth.....	320,979	6,129	52,923	7,012	6,690	230	329

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FRUIT-TREES OF BEARING AGE, 1906—CONCLUDED.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.	Quince.	Apricot.
Lincoln	27,515	1,085	51,981	4,785	8,496	31	3,734
Linn	112,825	3,239	32,385	9,182	7,961	288	240
Logan	1,369	121	2,285	966	1,380	3	329
Lyon	231,131	7,220	57,252	6,764	5,472	269	1,164
Marion	101,679	5,921	47,408	4,706	8,208	151	10,662
Marshall	130,072	2,491	111,413	7,292	11,175	31	1,274
McPherson	98,456	4,110	51,944	5,849	10,320	154	12,891
Meade	2,037	100	9,029	945	2,775	5	344
Miami	83,840	3,691	60,499	7,016	6,025	113	243
Mitchell	33,276	750	55,356	3,094	6,738	9	1,925
Montgomery	67,717	4,293	34,657	14,547	4,034	177	429
Morris	112,232	2,685	42,017	2,420	4,303	78	995
Morton	16	.....	118	124	169	.....	168
Nemaha	127,504	3,570	77,761	6,332	10,772	149	1,720
Neosho	91,820	2,694	33,859	14,520	3,889	576	285
Ness	2,450	630	18,266	7,645	5,019	159	1,783
Norton	6,922	376	46,110	1,854	9,964	6	35,783
Osage	191,050	4,262	47,992	4,618	8,131	290	979
Osborne	20,403	1,567	88,740	4,298	8,245	129	1,773
Ottawa	29,074	1,067	50,262	2,361	6,477	22	1,098
Pawnee	14,175	1,786	21,886	5,854	6,757	90	634
Phillips	17,430	635	89,641	4,935	13,081	19	3,490
Pottawatomie	87,821	2,179	48,408	4,221	5,926	29	577
Pratt	11,879	1,264	55,620	9,216	7,662	26	2,130
Rawlins	2,293	107	1,292	255	1,372	.....	286
Reno	211,569	12,978	164,187	17,383	20,998	156	9,871
Republic	128,325	2,162	118,944	5,863	12,825	12	2,889
Rice	73,482	2,783	57,097	3,794	11,420	69	2,946
Riley	90,010	1,640	44,158	3,199	6,160	29	654
Rooks	6,832	725	53,193	6,200	4,891	4	807
Rush	3,407	464	9,081	3,347	6,416	.....	660
Russell	6,600	394	23,289	1,548	4,222	23	574
Saline	50,539	1,846	63,272	5,209	6,270	106	1,750
Scott	717	35	3,270	5,048	2,658	2	301
Sedgwick	166,769	7,448	99,561	12,071	12,291	388	5,358
Seward	88	5	1,790	611	247	12	125
Shawnee	198,882	5,034	94,863	7,590	12,906	203	476
Sheridan	1,241	527	11,078	3,683	3,872	4	266
Sherman	526	58	740	11,229	1,144	.....	103
Smith	40,043	444	219,793	8,263	15,588	5	5,510
Stafford	32,781	2,470	72,576	9,712	13,460	17	3,415
Stanton	72	4	1,238	1,153	286	.....	74
Stevens	463	20	5,735	161	189	.....	11
Sumner	101,084	5,237	74,340	8,641	15,351	75	4,157
Thomas	379	112	3,508	8,040	2,064	139	.....
Trego	1,073	147	6,551	6,154	1,588	3	426
Wabaunsee	105,901	2,524	44,881	3,819	6,441	80	955
Wallace	333	51	1,243	1,850	371	.....	129
Washington	181,304	2,526	103,397	5,447	11,483	22	1,053
Wichita	571	55	1,483	1,199	968	.....	98
Wilson	106,422	2,645	29,845	9,899	3,312	197	334
Woodson	58,065	1,111	22,591	5,433	3,219	118	312
Wyandotte	141,143	10,134	147,669	20,753	21,989	456	172

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Table II.—FRUIT-TREES *NOT* OF BEARING AGE.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.	Quince.	Apricot.
THE STATE, 1906.....	1,627,331	147,166	1,052,998	192,189	288,339	4,788	49,049
Allen.....	9,511	1,781	4,119	1,221	1,757	64	72
Anderson.....	17,626	1,704	5,566	1,404	2,980	84	161
Atchison.....	21,379	962	7,110	992	2,980	11	42
Barber.....	17,516	404	14,854	1,721	3,608	51	1,117
Barton.....	11,698	1,026	9,276	1,917	3,106	16	488
Bourbon.....	10,791	1,353	6,586	1,757	1,425	25	37
Brown.....	26,898	1,424	7,883	1,088	1,644	22	46
Butler.....	26,530	2,689	16,418	2,778	3,875	87	1,086
Chase.....	8,859	883	3,853	416	1,035	40	214
Chautauqua.....	13,661	1,697	6,296	1,358	1,733	88	367
Cherokee.....	14,578	1,822	9,266	1,557	2,201	96	66
Cheyenne.....	1,152	81	595	1,598	1,188	.....	27
Clark.....	2,508	158	1,762	212	688	33	114
Clay.....	15,084	1,149	11,331	934	2,333	12	307
Cloud.....	10,186	912	13,769	1,159	2,403	10	894
Coffey.....	24,346	2,320	10,916	2,153	3,170	69	201
Comanche.....	3,568	696	5,283	5,384	1,496	7	209
Cowley.....	59,528	3,653	20,539	3,467	5,704	171	1,142
Crawford.....	11,962	2,956	7,786	1,466	1,263	68	44
Decatur.....	4,441	422	22,827	2,222	5,781	7	520
Dickinson.....	11,606	1,532	11,533	1,137	3,222	46	714
Doniphan.....	68,170	4,363	16,405	2,740	3,826	6	33
Douglas.....	34,560	6,079	12,964	1,508	2,765	37	78
Edwards.....	5,537	916	8,046	1,775	2,428	2	267
Elk.....	13,417	1,304	7,186	2,595	2,611	77	260
Ellis.....	1,134	105	1,581	1,213	1,157	.....	105
Ellsworth.....	7,829	675	7,934	1,209	2,582	29	347
Finney.....	3,267	430	7,081	3,356	2,896	10	88
Ford.....	2,835	395	7,231	1,747	3,053	.....	464
Franklin.....	25,311	3,363	10,411	1,707	2,941	73	154
Geary.....	5,028	336	4,012	410	1,093	27	111
Gove.....	2,501	490	7,386	3,267	1,468	13	452
Graham.....	4,071	331	14,347	1,947	2,695	4	792
Grant.....	191	9	933	607	440	.....	147
Gray.....	275	25	728	250	300	20	140
Greeley.....	235	29	247	258	427	.....	.....
Greenwood.....	22,729	2,043	10,279	2,418	3,091	87	281
Hamilton.....	635	53	1,035	558	300	.....	55
Harper.....	24,900	2,960	22,267	5,601	6,819	121	1,865
Harvey.....	20,368	1,829	9,175	1,205	2,178	70	1,113
Haskell.....	32	.....	386	134	122	.....	.....
Hodgeman.....	1,140	168	3,052	946	1,067	16	412
Jackson.....	17,369	1,283	13,050	1,606	2,529	34	154
Jefferson.....	53,292	3,395	16,390	1,486	3,239	23	124
Jewell.....	11,763	726	26,870	1,447	3,902	30	952
Johnson.....	14,706	2,292	9,581	1,996	3,704	59	68
Kearny.....	1,326	38	3,704	1,557	1,112	12	121
Kingman.....	16,900	1,858	16,575	1,824	2,845	81	1,163
Kiowa.....	2,868	540	10,249	1,411	2,175	7	542
Labette.....	18,161	4,672	11,829	2,903	4,583	240	127
Lane.....	2,526	310	3,152	2,481	1,742	3	125
Leavenworth.....	36,887	3,710	11,144	1,599	2,999	96	163
Lincoln.....	10,554	655	9,530	1,143	2,002	19	733
Linn.....	39,718	2,322	9,099	2,518	8,257	90	120
Logan.....	810	129	2,064	469	1,188	7	304
Lyon.....	29,136	4,157	10,457	1,100	2,401	129	220
Marion.....	12,992	1,346	7,028	1,231	3,205	125	4,397
Marshall.....	18,858	928	19,345	1,652	2,654	104	266
McPherson.....	12,310	1,260	7,863	926	2,614	73	1,887
Meade.....	1,757	146	3,575	955	1,257	9	222
Miami.....	50,810	3,290	14,933	3,387	4,899	122	196
Mitchell.....	7,247	403	9,526	759	1,661	10	1,006

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FRUIT-TREES *NOT* OF BEARING AGE, 1906—CONCLUDED.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.	Quince.	Apricot.
Montgomery	15,365	4,640	14,861	3,070	3,394	150	331
Morris	13,199	818	7,584	672	1,447	21	262
Morton	29	3	64	20	54	.....	30
Nemaha	21,274	1,361	13,084	1,249	2,625	16	128
Neosho	12,289	1,776	8,940	1,849	1,258	63	60
Ness	5,419	551	7,309	8,742	4,833	13	119
Norton	41,073	330	14,414	1,420	3,645	50	1,224
Osage	24,726	2,391	9,294	1,238	3,914	157	321
Osborne	10,812	1,387	20,131	1,689	3,600	32	692
Ottawa	8,188	611	7,329	666	1,448	6	328
Pawnee	5,742	1,117	6,503	2,674	3,146	47	606
Phillips	11,365	825	30,324	2,778	6,167	21	1,499
Pottawatomie	14,716	1,373	10,208	1,815	2,199	16	191
Pratt	11,197	1,416	20,821	2,766	5,970	96	1,725
Rawlins	2,660	201	2,309	489	1,117	2	163
Reno	88,052	4,452	34,906	2,905	7,166	75	2,388
Republic	20,186	1,235	19,879	2,414	4,301	31	514
Rice	13,652	992	9,133	1,022	2,077	35	501
Riley	15,663	1,120	6,096	1,245	2,044	27	157
Rooks	9,629	693	22,713	2,406	3,508	22	501
Rush	2,350	528	2,980	822	2,622	20	200
Russell	4,484	479	5,207	837	1,602	35	225
Saline	9,125	526	6,628	1,336	1,731	10	256
Scott	1,196	84	3,196	2,055	1,843	7	395
Sedgwick	98,536	5,359	39,201	4,997	8,900	232	1,664
Seward	261	12	545	548	338	.....	8
Shawnee	45,777	2,576	13,268	1,479	2,811	34	84
Sheridan	4,348	891	9,257	2,466	3,932	8	294
Sherman	1,739	146	824	1,551	1,576	14	65
Smith	13,085	436	37,024	2,623	5,269	19	2,348
Stafford	15,929	2,148	15,266	1,991	4,032	23	675
Stanton	58	.....	498	278	326	.....	27
Stevens	189	21	385	225	135	.....	.....
Sumner	33,497	2,428	17,194	2,113	5,232	51	820
Thomas	1,105	199	3,471	4,722	2,436	35	131
Trego	1,940	246	3,146	2,732	1,178	4	151
Wabaunsee	23,956	1,507	7,102	1,074	1,905	62	1,238
Wallace	637	97	1,365	4,418	472	1	114
Washington	16,967	1,216	18,222	1,148	2,813	87	318
Wichita	492	54	514	283	475	1	126
Wilson	16,964	1,375	6,937	1,745	1,822	83	113
Woodson	10,548	2,250	4,274	1,372	1,483	61	112
Wyandotte	51,449	8,309	25,024	6,408	14,674	199	123

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Table III.—ACREAGE AND PRODUCT OF SMALL FRUITS.

Product of 1905. Acreage is for 1906.	Strawberries.		Raspberries.		Blackberries.		Gooseberries.	
COUNTIES.	Acres.	Crates.	Acres.	Crates.	Acres.	Crates.	Acres.	Crates.
THE STATE	3,669	197,878	2,217	43,914	4,588	92,481	788	7,150
Allen	38	2,822	97	262	43	731	3	167
Anderson	17	472	19	144	31	251	3	56
Atchison	60	5,502	159	404	76	4,351	1	20
Barber	3	76	5	.....	7	160	1	10
Barton	1	256	1	3	1	23	4	.....
Bourbon	91	1,847	40	88	103	948	22	2
Brown	41	3,699	12	710	25	1,295	2	66
Butler	30	2,783	34	207	91	416	5	233
Chase	9	825	6	52	9	106	3	17
Chautauqua	23	2,382	2	94	77	2,380	1	.....
Cherokee	314	12,280	41	160	83	451	9	73
Cheyenne	.....	434	.....	11	.....	61	3	239
Clark	.....	.....	.....	40	.....	.....	1	44
Clay	22	1,670	3	254	1	25	1	1
Cloud	11	214	7	16	9	31	3	12
Coffey	64	2,570	14	157	80	507	11	3
Comanche	1	.....	.....	8	1	.....	1	10
Cowley	83	2,747	14	220	141	2,148	56	175
Crawford	108	5,591	57	88	42	443	37	62
Decatur	5	34	7	43	.....	.....	6	352
Dickinson	12	602	1	58	5	112	2	16
Doniphan	269	20,335	318	12,555	450	26,894	4	57
Douglas	85	5,001	55	1,409	69	1,529	3	9
Edwards	2	30	.....	.....	.....	37	1	4
Elk	24	1,048	9	56	64	843	2	66
Ellis	1	.....	1	60	1	60	1	.....
Ellsworth	6	76	1	1	2	6	1	.....
Finney	5	333	5	310	7	3	3	205
Ford	3	9	44	.....	3	.....	3	40
Franklin	75	2,255	114	299	107	571	3	1
Geary	39	345	3	47	3	43	1	3
Gove	2	415	.....	38	1	.....	3	163
Graham	2	9	3	6	2	2	2	57
Grant	.....	.....	.....	.....	.....	.....	63	.....
Gray	2	6	.....	.....	.....	.....	.....	.....
Greeley	.....	.....	.....	.....	.....	.....	.....	12
Greenwood	140	1,141	8	256	351	1,015	5	4
Hamilton	3	26	.....	.....	.....	.....	.....	.....
Harper	7	147	2	4	7	152	2	3
Harvey	23	1,829	7	175	24	135	3	88
Haskell	1	.....	.....	.....	1	.....	1	.....
Hodgeman	3	1	.....	2	.....	1	1	2
Jackson	83	4,044	49	244	58	590	1	70
Jefferson	145	6,290	37	2,359	75	1,998	12	547
Jewell	3	63	1	42	2	5	2	10
Johnson	58	5,801	61	950	92	1,339	4	142
Kearny	.....	.....	1	1	.....	2	.....	23
Kingman	4	201	6	74	21	1,023	3	43
Kiowa	2	12	.....	.....	1	2	2	34
Labette	85	9,539	60	223	102	1,933	11	80
Lane	1	15	2	14	.....	15	1	17
Leavenworth	132	15,417	53	4,365	71	14,136	2	350
Lincoln	11	17	.....	1	1	1	2	53
Linn	32	1,145	11	149	84	543	5	42
Logan	.....	71	.....	1	.....	.....	1	119
Lyon	217	3,176	19	266	121	677	7	208
Marion	57	840	6	65	8	146	2	20
Marshall	28	1,903	5	405	11	324	2	29
McPherson	14	570	7	67	8	269	2	51
Meade	.....	10	.....	.....	2	10	1	22

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ACREAGE AND PRODUCT OF SMALL FRUITS—CONCLUDED.
Product of 1905; acreage is for 1906.

COUNTIES.	Strawberries.		Raspberries.		Blackberries.		Gooseberries.	
	Acres.	Crates.	Acres.	Crates.	Acres.	Crates.	Acres.	Crates.
Miami	85	2,343	26	590	179	591	4	55
Mitchell	6	726	2	.....	.....	5	1	60
Montgomery	108	5,109	36	183	114	1,510	4	33
Morris	15	1,114	3	110	7	262	1	20
Morton	.....	.....	.....	.....	.....	.....	.....	.....
Nemaha	23	2,741	16	393	20	291	3	93
Neosho	144	9,231	16	239	114	654	205	114
Ness	3	260	.....	.....	1	.....	5	49
Norton	1	286	2	28	.....	.....	1	217
Osage	46	4,087	52	500	104	1,554	6	347
Osborne	3	958	2	301	.....	.....	1	18
Ottawa	30	1,401	8	14	31	602	8	4
Pawnee	4	653	.....	8	1	1	2	11
Phillips	16	28	1	10	1	.....	2	15
Pottawatomie	23	748	15	586	31	286	10	41
Pratt	3	91	2	6	10	4	6	55
Rawlins	1	7	.....	.....	.....	.....	1	33
Reno	13	536	12	220	104	1,569	3	116
Republic	14	153	6	359	4	.....	8	200
Rice	4	252	4	74	17	192	.....	65
Riley	36	2,519	15	391	6	156	4	15
Rooks	6	38	.....	1	.....	1	2	3
Rush	2	12	1	.....	.....	.....	1	.....
Russell	2	674	.....	77	.....	35	.....	151
Saline	8	287	20	63	17	5	1	15
Scott	3	3	.....	20	.....	2	1	.....
Sedgwick	43	798	28	154	78	598	5	29
Seward	1	.....	.....	.....	1	.....	3	.....
Shawnee	131	7,896	191	396	125	877	5	264
Sheridan	1	269	.....	22	.....	1	1	95
Sherman	1	12	.....	.....	.....	.....	1	2
Smith	16	543	9	30	2	1	3	3
Stafford	2	185	13	77	12	141	2	172
Stanton	.....	.....	.....	.....	.....	.....	.....	15
Stevens	.....	2	.....	.....	.....	.....	.....	.....
Sumner	12	359	4	708	270	642	83	17
Thomas	3	109	.....	2	.....	.....	1	42
Trego	1	26	.....	.....	.....	.....	.....	4
Wabaunsee	18	1,137	11	100	16	158	2	6
Wallace	.....	54	.....	12	.....	.....	1	119
Washington	39	442	11	25	45	28	2	20
Wichita	.....	2	.....	.....	.....	1	.....	26
Wilson	120	5,128	16	543	427	987	2	157
Woodson	20	1,289	14	143	52	790	6	64
Wyandotte	165	16,442	274	10,166	220	11,299	54	258

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Table IV.—VINEYARDS, GARDENS, FRUIT, VEGETABLES, ETC.

COUNTIES.	Acres, vineyards.	Eight-pound baskets of grapes.	Acres, gardens.	Sales, vegetables, 1905.	Value of all fruit, 1905.
THE STATE, 1906	8,781	608,257	26,218	$400,903	$1,588,172
Allen	62	6,047	343	$13,950	$10,148
Anderson	90	7,321	297	414	13,715
Atchison	253	9,544	352	6,174	12,671
Barber	88	2,956	228	3,716	10,053
Barton	24	1,245	357	1,664	5,610
Bourbon	34	3,153	575	569	10,637
Brown	69	9,091	180	3,226	27,298
Butler	91	4,962	1,781	1,550	19,410
Chase	35	2,264	204	817	11,595
Chautauqua	137	7,488	318	2,545	9,739
Cherokee	326	6,269	893	22,080	23,483
Cheyenne	1	5	42	713	1,012
Clark	3	52	18	1,095	482
Clay	103	7,991	297	3,628	20,792
Cloud	110	3,921	215	1,080	17,471
Coffey	56	11,336	258	1,324	24,095
Comanche	132	1,568	51	1,828	6,206
Cowley	887	12,753	457	3,951	34,343
Crawford	116	2,155	292	11,339	6,985
Decatur	6	232	158	757	2,502
Dickinson	65	4,438	315	1,137	18,319
Doniphan	405	87,868	219	1,443	92,306
Douglas	119	4,254	723	11,830	18,907
Edwards	13	136	23	260	1,784
Elk	49	6,447	403	1,682	22,473
Ellis	4	87	116	100	842
Ellsworth	24	492	358	2,983	5,288
Finney	23	1,378	66	2,002	13,229
Ford	25	12	120	660	1,439
Franklin	67	5,979	.....	.....	12,053
Geary	98	14,126	79	3,917	6,725
Gove	57	394	30	801	1,977
Graham	56	1,260	155	2,277	2,350
Grant	.....	12	5	76	137
Gray	.....	60	.....	.....	490
Greeley	.....	.....	.....	.....	162
Greenwood	145	7,163	664	3,320	24,596
Hamilton	.....	.....	37	345	.....
Harper	76	3,592	272	2,897	14,220
Harvey	56	4,787	367	3,482	17,665
Haskell	.....	.....	.....	.....	.....
Hodgeman	2	103	32	507	247
Jackson	122	8,843	271	984	36,334
Jefferson	115	3,453	346	135	20,615
Jewell	23	464	291	427	18,628
Johnson	79	7,317	350	17,932	7,935
Kearny	4	278	27	607	8,260
Kingman	81	3,287	190	848	17,314
Kiowa	10	117	88	752	2,048
Labette	81	1,996	409	4,970	17,391
Lane	21	224	84	544	948
Leavenworth	321	11,317	335	9,897	24,918
Lincoln	89	364	88	669	6,933
Linn	44	2,461	132	510	67,586
Logan	2	92	40	362	890
Lyon	166	3,458	20	2,205	34,679
Marion	127	11,785	639	2,797	23,940
Marshall	113	10,571	445	1,027	29,492
McPherson	120	3,835	471	1,828	30,815
Meade	4	.....	141	369	1,666

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VINEYARDS, GARDENS, FRUIT, VEGETABLES, ETC., 1906—CONCLUDED.

COUNTIES.	Acres, vineyards.	Eight-pound baskets of grapes.	Acres, gardens.	Sales, vegetables, 1905.	Value of all fruit, 1905.
Miami	94	6,871	4	$3,236	$31,245
Mitchell	13	402	206	1,815	8,941
Montgomery	94	2,236	527	11,720	12,107
Morris	55	2,674	218	1,104	33,820
Morton	.....	.....	.....	.....	.....
Nemaha	308	22,110	497	2,774	36,344
Neosho	31	2,467	201	4,648	18,018
Ness	8	10	169	531	1,294
Norton	52	215	113	765	3,957
Osage	176	17,892	205	2,348	26,029
Osborne	13	243	199	257	7,909
Ottawa	33	1,918	228	3,253	14,440
Pawnee	15	911	151	2,889	4,831
Phillips	21	886	202	2,868	4,282
Pottawatomie	105	8,089	384	2,063	20,210
Pratt	46	1,451	115	731	5,084
Rawlins	1	.....	48	703	722
Reno	174	18,966	525	7,254	90,795
Republic	92	7,210	213	905	25,720
Rice	84	5,023	321	2,813	34,972
Riley	86	5,948	606	18,922	19,461
Rooks	15	33	105	880	3,130
Rush	66	53	54	439	955
Russell	52	360	78	728	3,451
Saline	34	2,350	419	2,953	14,074
Scott	1	26	40	825	448
Sedgwick	270	12,120	1,121	37,991	53,568
Seward	.....	.....	3	.....	40
Shawnee	148	18,593	924	34,485	31,151
Sheridan	18	31	90	44	714
Sherman	7	.....	32	2,050	271
Smith	13	419	175	1,651	11,410
Stafford	58	1,839	34	174	9,288
Stanton	.....	.....	5	26	47
Stevens	.....	.....	2	.....	200
Sumner	66	6,522	340	4,873	18,768
Thomas	13	.....	21	39	546
Trego	5	46	22	163	316
Wabaunsee	124	8,651	177	283	21,046
Wallace	.....	41	54	970	1,325
Washington	106	11,285	298	1,622	41,279
Wichita	.....	.....	14	45	.....
Wilson	285	3,851	271	7,814	8,782
Woodson	75	4,905	288	1,173	9,500
Wyandotte	495	113,817	852	61,124	83,834

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Table V.—FRUIT GROWN IN 1905.

Counties.	Bushels.				
	Apples.	Pears.	Peaches.	Plums.	Cherries.
The State	2,450,808	18,731	77,274	35,523	33,470
Allen	21,153	174	45	424	59
Anderson	30,360	253	628	294	615
Atchison	12,454	8	168	59	250
Barber	14,206	65	2,442	801	506
Barton	10,962	88	457	114	374
Bourbon	14,546	774	49	369	490
Brown	52,722	42	194	399	649
Butler	48,195	214	747	178	256
Chase	17,044	90	991	227	166
Chautauqua	18,439	246	445	1,010	84
Cherokee	35,882	67	53	727	184
Cheyenne	283	3	41	163	228
Clark	526	6	236	7	33
Clay	39,590	35	96	62	162
Cloud	38,867	12	56	63	250
Coffey	51,477	199	1,323	721	166
Comanche	2,798	332	1,551	155	166
Cowley	57,521	735	843	679	656
Crawford	9,327	133	10	178	52
Decatur	1,237	.....	868	141	451
Dickinson	43,739	325	2,331	505	480
Doniphan	29,936	117	300	390	549
Douglas	23,836	799	474	256	565
Edwards	1,855	40	169	189	330
Elk	39,858	752	5,857	1,793	381
Ellis	629	5	24	53	107
Ellsworth	10,480	64	490	65	359
Finney	7,694	39	905	1,910	1,245
Ford	828	.....	1,335	107	179
Franklin	18,708	344	2,207	244	230
Geary	11,236	124	133	82	78
Gove	195	2	434	456	154
Graham	638	1	209	249	150
Grant	.....	.....	171	62	11
Gray	235	.....	4	14	100
Greeley	3	.....	21	54	24
Greenwood	41,785	370	4,080	1,274	487
Hamilton	305	10	602	115	139
Harper	25,298	411	1,568	933	414
Harvey	39,451	592	2,466	282	542
Haskell	.....	.....	16	5	.....
Hodgeman	175	3	192	15	49
Jackson	52,950	138	2,066	259	525
Jefferson	19,571	200	412	73	301
Jewell	46,644	28	222	98	76
Johnson	2,840	85	104	578	1,118
Kearny	6,523	2	1,478	768	257
Kingman	34,589	396	863	421	247
Kiowa	1,393	6	1,149	90	54
Labette	24,660	654	50	497	128
Lane	565	2	194	416	110
Leavenworth	22,208	78	223	263	150
Lincoln	13,373	16	194	47	45
Linn	47,036	230	269	2,419	960
Logan	683	8	116	64	100
Lyon	69,102	835	2,229	184	374
Marion	42,007	414	2,924	307	377
Marshall	77,745	20	68	85	245
McPherson	60,812	445	3,531	451	720
Meade	950	25	765	253	94

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FRUIT GROWN IN 1905—CONCLUDED.

COUNTIES.	Bushels.				
	Apples.	Pears.	Peaches.	Plums.	Cherries.
Miami	33,208	393	1,166	537	471
Mitchell	13,150	2	183	151	96
Montgomery	7,210	173	154	673	413
Morris	73,922	225	559	111	157
Morton	.....	.....	.....	.....	.....
Nemaha	74,834	46	650	215	961
Neosho	16,915	156	27	465	54
Ness	590	10	258	163	8
Norton	2,650	12	425	126	346
Osage	48,290	300	2,350	239	911
Osborne	13,036	8	335	104	161
Ottawa	14,736	9	137	85	141
Pawnee	6,787	198	117	106	335
Phillips	6,000	10	518	347	246
Pottawatomie	40,439	78	1,153	139	213
Pratt	4,852	14	2,460	60	176
Rawlins	749	2	44	15	105
Reno	141,290	1,933	8,466	1,052	1,261
Republic	59,209	4	13	189	234
Rice	78,247	871	850	317	719
Riley	32,754	106	47	210	213
Rooks	3,062	22	247	68	145
Rush	708	12	287	514	140
Russell	4,077	19	53	13	157
Saline	26,717	244	796	537	237
Scott	155	.....	98	297	84
Sedgwick	138,407	1,207	2,471	553	606
Seward	21	.....	20	18	2
Shawnee	36,480	61	742	369	1,393
Sheridan	208	.....	56	95	168
Sherman	215	.....	18	54	160
Smith	18,658	12	709	299	218
Stafford	16,172	118	918	618	438
Stanton	4	.....	3	16	2
Stevens	170	.....	305	.....	5
Sumner	49,473	586	646	482	571
Thomas	23	.....	90	89	130
Trego	85	.....	27	55	23
Wabaunsee	60,645	199	711	168	148
Wallace	365	2	219	428	185
Washington	89,394	81	9	49	140
Wichita	85	1	333	.....	29
Wilson	14,287	204	145	586	353
Woodson	19,473	146	1,335	480	158
Wyandotte	5,047	271	41	1,334	2,511

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Table VI.—FORESTRY STATISTICS.

Counties.	Street trees.	Wild timber.	Cultivated.				
	Number.	Acres.	Walnut, acres.	Locust, acres.	Cottonwood, acres.	Catalpa, acres.	Other varieties. acres.
The State, 1906	706,734	389,832	22,716	20,978	23,382	11,712	118,654
Allen	3,559	1,833	40	113	24	76	127
Anderson	10,180	4,843	280	600	1	36	1,587
Atchison	.....	3,068	6	.....	13	.....	73
Barber	2,638	7,241	156	667	225	166	681
Barton	11,059	908	169	249	489	46	890
Bourbon	180	4,969	5	.....	.....	24	11
Brown	3,201	5,860	317	63	386	25	16,853
Butler	8,018	9,726	367	9	55	361	298
Chase	3,657	5,853	17	1	8	8	35
Chautauqua	78	6,715	31	2	8	4	96
Cherokee	12,121	13,967	59	7	9	90	459
Cheyenne	419	32	2	7	2	.....	113
Clark	140	541	.....	146	26	1	1
Clay	19,181	5,196	41	7	221	25	401
Cloud	13,620	3,304	43	105	157	29	1,227
Coffey	10,105	3,411	17	.....	24	35	1,352
Comanche	1,470	1,806	5	331	94	47	82
Cowley	7,908	4,600	43	29	32	76	175
Crawford	4,828	2,459	6	.....	1	111	32
Decatur	3,265	1,429	4	59	13	2	344
Dickinson	4,288	3,544	55	14	137	17	614
Doniphan	2,276	11,518	49	17	31	2	216
Douglas	6,504	7,880	59	9	.....	.....	19
Edwards	417	.....	18	70	447	16	218
Elk	5,919	9,100	21	2	6	17	302
Ellis	262	206	5	448	162	.....	63
Ellsworth	23,171	2,606	7	76	41	.....	319
Finney	21,429	1,023	250	206	14	.....	13
Ford	10,289	230	229	6,382	283	1,017	3,407
Franklin	.....	.....	.....	.....	.....	.....	.....
Geary	2,408	7,480	349	108	12	11	111
Gove	6,897	4	1	24	23	2	9
Graham	1,450	531	10	158	174	1	298
Grant	.....	.....	.....	.....	8	.....	.....
Gray	100	6	9	218	68	9	113
Greeley	.....	.....	.....	.....	.....	.....	.....
Greenwood	21,025	15,533	34	2	54	687	224
Hamilton	1,100	1,150	.....	.....	.....	.....	.....
Harper	87,107	314	77	620	509	1,172	633
Harvey	23,181	502	4,023	657	6,781	925	4,833
Haskell	.....	.....	25	631	1	.....	29
Hodgeman	62	40	.....	1,516	128	.....	15
Jackson	7,557	6,163	9	6	.....	13	136
Jefferson	6,230	20,567	72	.....	5	10	393
Jewell	3,029	9,831	197	16	110	33	768
Johnson	1,588	2,125	31	2	.....	.....	470
Kearny	414	21	7	34	82	6	49
Kingman	2,589	67	83	235	513	133	632
Kiowa	5,008	303	1	12	104	3	55
Labette	1,151	5,062	120	1	.....	32	379
Lane	61	70	.....	30	29	5	16
Leavenworth	260	12,062	36	2	.....	.....	1,359
Lincoln	681	1,611	28	31	58	1	535
Linn	14,263	5,250	46	20	.....	118	17
Logan	188	47	.....	34	.....	2	51
Lyon	30,032	4,654	47	6	11	38	179
Marion	13,384	1,298	179	83	846	277	8,025

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FORESTRY STATISTICS, 1906—CONCLUDED.

COUNTIES.	Street trees.	Wild timber.	Cultivated.				
	Number.	Acres.	Walnut, acres.	Locust, acres.	Cottonwood, acres.	Catalpa, acres.	Other varieties, acres.
Marshall	8,355	11,900	31	3	87	65	514
McPherson	17,608	1,745	146	7	346	30	1,626
Meade	7,386	60	10	1,467	177	7	523
Miami	1,954	12,600	38	6	1	9	336
Mitchell	2,294	2,984	97	118	104	4	773
Montgomery	7,988	7,253	124	2	.....	2	32
Morris	13,307	6,483	27	8	20	29	253
Morton	.....	.....	.....	.....	.....	.....	1
Nemaha	6,654	14,449	212	8	80	65	972
Neosho	8,032	3,548	1,873	74	673	1,359	5,188
Ness	11,911	84	33	72	276	57	204
Norton	670	1,151	2	27	11	500	778
Osage	3,762	4,025	43	3	3	34	550
Osborne	10,686	4,105	34	298	50	8	464
Ottawa	5,590	2,213	303	251	595	24	1,058
Pawnee	26,896	834	9	64	191	18	475
Phillips	1,865	2,276	244	338	46	3	548
Pottawatomie	1,358	14,853	123	60	40	1,074	324
Pratt	12,415	339	10,222	248	168	56	38,333
Rawlins	497	942	.....	17	5	.....	229
Reno	1,588	629	147	260	2,498	1,487	2,243
Republic	19,270	6,060	40	16	448	36	2,878
Rice	26,517	640	66	72	590	118	1,254
Riley	136	9,265	35	.....	55	5	393
Rooks	1,031	1,414	15	778	417	5	997
Rush	8,278	336	12	124	39	.....	549
Russell	2,154	2,165	5	130	11	7	239
Saline	5,098	2,718	99	20	234	14	608
Scott	1,358	1,010	1	7	15	1	14
Sedgwick	9,563	2,569	151	1,086	1,645	77	1,741
Seward	.....	24	.....	50	2	2	8
Shawnee	3,991	4,559	8	3	2	19	10
Sheridan	640	66	1	43	42	.....	171
Sherman	300	.....	.....	7	12	5	87
Smith	5,956	4,813	34	30	43	1	906
Stafford	15,944	20	57	160	975	123	963
Stanton	.....	5	.....	4	10	.....	10
Stevens	.....	.....	.....	87	5	1	211
Sumner	14,440	2,695	98	304	489	78	1,017
Thomas	849	.....	.....	552	224	414	163
Trego	800	11	5	77	39	.....	24
Wabaunsee	4,750	11,354	22	1	10	28	122
Wallace	42	14	.....	17	14	.....	29
Washington	4,367	10,769	16	1	67	45	688
Wichita	12	.....	.....	16	.....	1	.....
Wilson	8,119	6,041	63	1	6	159	356
Woodson	2,770	8,997	85	1	192	38	455
Wyandotte	141	3,320	.....	.....	.....	.....	.....

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HORTICULTURAL STATISTICS, 1907.

Table VII.—FRUIT-TREES OF BEARING AGE.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.	Quince.	Apricot.
THE STATE, 1907.....	6,610,597	249,906	5,275,824	681,588	694,959	10,504	169,883
Allen.....	91,306	3,350	36,761	8,079	3,805	146	386
Anderson.....	69,950	3,507	28,656	5,194	5,179	216	433
Atchison.....	122,177	2,769	37,121	3,642	7,144	61	1,143
Barber.....	16,510	1,496	39,345	4,411	3,928	16	2,044
Barton.....	27,429	1,836	48,446	4,740	10,895	13	1,997
Bourbon.....	74,036	2,556	31,562	10,586	3,479	119	142
Brown.....	139,259	4,058	61,402	12,366	10,232	42	487
Butler.....	146,747	4,080	95,061	9,773	7,551	170	4,075
Chase.....	47,760	1,711	25,254	2,726	2,832	51	1,359
Chautauqua.....	67,438	2,271	33,750	8,604	4,098	207	692
Cherokee.....	132,755	1,943	31,960	8,827	4,847	185	112
Cheyenne.....	1,167	54	721	1,871	1,929	.....	20
Clark.....	2,263	184	7,249	414	1,182	3	353
Clay.....	67,346	1,909	66,688	3,780	7,977	25	1,796
Cloud.....	56,021	1,480	89,773	7,069	10,054	37	4,073
Coffey.....	114,248	3,979	47,497	5,898	5,898	196	575
Comanche.....	3,397	266	11,757	956	2,391	10	553
Cowley.....	164,572	6,625	118,066	16,945	14,072	396	3,524
Crawford.....	83,933	2,654	20,037	6,204	2,772	66	189
Decatur.....	5,643	630	35,982	3,512	12,844	3	681
Dickinson.....	95,039	8,053	103,287	5,983	10,320	115	6,679
Doniphan.....	297,513	11,343	83,807	12,209	9,037	90	682
Douglas.....	110,414	10,914	147,446	6,355	8,128	279	491
Edwards.....	5,284	650	24,721	5,674	4,392	23	603
Elk.....	81,251	3,042	36,725	12,847	4,382	183	432
Ellis.....	3,214	289	8,008	4,008	4,595	26	285
Ellsworth.....	18,170	1,091	38,765	2,768	6,674	31	1,432
Finney.....	6,897	338	10,851	7,737	3,674	14	389
Ford.....	2,517	336	32,014	4,044	6,685	19	1,872
Franklin.....	78,026	3,020	40,702	5,048	4,940	189	282
Geary.....	33,207	1,116	21,825	1,789	3,110	12	502
Gove.....	1,393	321	19,789	11,388	2,896	11	433
Graham.....	3,189	301	33,834	4,270	4,873	8	734
Grant.....	20	.....	2,239	738	304	.....	2
Gray.....	1,020	95	4,990	1,402	1,326	6	155
Greeley.....	37	5	192	596	328	.....	21
Greenwood.....	125,683	3,365	45,677	11,117	5,390	231	666
Hamilton.....	972	67	2,447	2,803	819	10	259
Harper.....	40,478	2,917	55,178	8,166	8,801	210	3,285
Harvey.....	74,876	4,171	47,941	6,153	6,267	182	4,869
Haskell.....	.....	2	2,758	170	82	3	53
Hodgeman.....	1,091	196	13,412	3,115	2,483	13	814
Jackson.....	112,100	3,153	70,529	7,001	9,290	117	338
Jefferson.....	171,200	8,783	88,329	8,296	10,527	366	559
Jewell.....	97,409	1,958	262,720	9,389	21,910	416	6,789
Johnson.....	64,572	6,216	62,185	6,855	9,799	204	346
Kearny.....	6,261	64	6,313	4,843	1,370	13	523
Kingman.....	39,623	2,876	65,344	9,809	7,394	198	2,945
Kiowa.....	2,474	335	26,497	1,613	2,386	.....	567
Labette.....	132,298	5,055	36,636	10,842	4,473	328	209
Lane.....	2,192	272	8,045	13,180	2,391	13	287
Leavenworth.....	313,081	6,137	54,460	6,632	6,578	249	413

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FRUIT-TREES OF BEARING AGE, 1907—CONCLUDED.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.	Quince.	Apricot.
Lincoln	21,917	1,005	57,903	7,185	8,627	32	3,716
Linn	106,080	3,284	39,453	12,275	8,123	196	294
Logan	1,810	198	2,600	898	1,645	2	302
Lyon	157,295	5,263	45,898	7,138	5,906	279	1,140
Marion	6,210	5,004	52,648	4,829	8,163	90	11,848
Marshall	130,052	2,376	104,923	5,723	10,833	95	1,240
McPherson	89,526	3,422	51,562	6,049	10,021	207	14,371
Meade	1,773	207	13,779	2,675	3,802	6	507
Miami	86,994	3,850	38,513	7,597	5,910	122	204
Mitchell	33,994	578	66,096	3,504	7,145	14	2,750
Montgomery	65,094	3,545	40,186	13,115	4,294	186	633
Morris	120,862	2,328	50,374	2,554	4,579	107	1,677
Morton	167	2	448	162	147	.....	218
Nemaha	145,141	2,986	29,077	6,722	11,723	136	1,868
Neosho	91,295	2,539	43,968	17,307	4,018	174	291
Ness	3,025	411	17,093	15,389	4,697	13	2,052
Norton	6,105	366	69,144	3,373	9,935	.....	3,940
Osage	167,430	4,090	59,582	5,610	9,020	366	756
Osborne	18,848	1,718	99,566	3,358	9,052	39	2,025
Ottawa	29,163	968	65,497	2,940	6,547	26	1,522
Pawnee	16,551	2,142	25,602	9,819	8,569	122	802
Phillips	18,712	751	101,291	6,864	14,603	32	3,367
Pottawatomie	87,744	2,147	51,363	4,159	6,609	89	671
Pratt	10,910	914	67,452	14,387	7,983	388	1,978
Rawlins	2,254	32	1,860	391	1,960	2	309
Reno	297,982	8,039	209,647	16,588	22,126	190	10,307
Republic	126,902	3,225	119,420	6,910	11,188	39	3,148
Rice	63,029	2,442	58,046	4,816	9,933	73	3,004
Riley	86,595	2,047	45,087	6,039	6,208	36	771
Rooks	11,523	881	73,308	9,172	7,194	39	964
Rush	3,416	584	14,645	7,614	7,772	14	1,352
Russell	7,984	553	28,875	2,025	5,670	22	905
Saline	47,063	2,114	61,742	6,307	6,872	71	1,897
Scott	995	69	7,821	4,078	3,116	7	505
Sedgwick	168,287	6,944	116,943	14,402	14,449	309	6,347
Seward	135	17	866	1,179	158	7	84
Shawnee	215,439	6,618	127,100	9,409	19,292	170	815
Sheridan	2,480	404	11,523	3,020	3,969	1	253
Sherman	410	30	661	2,794	1,209	.....	143
Smith	70,722	735	238,318	13,656	18,471	23	6,886
Stafford	30,748	2,646	74,759	8,256	12,101	31	2,695
Stanton	70	9	1,536	854	369	.....	91
Stevens	522	25	7,509	246	286	.....	12
Sumner	103,264	4,886	91,246	9,322	14,458	161	3,926
Thomas	512	123	2,955	4,358	2,718	2	147
Trego	2,186	274	8,783	11,912	2,287	7	889
Wabaunsee	110,134	3,162	125,475	5,134	7,401	143	1,119
Wallace	861	126	1,562	4,537	537	1	154
Washington	158,500	2,433	104,879	5,416	10,179	49	1,052
Wichita	387	183	1,840	567	763	.....	95
Wilson	109,904	2,599	38,148	11,608	3,293	218	263
Woodson	57,892	2,585	23,083	4,489	3,296	144	292
Wyandotte	158,295	12,188	159,420	20,470	26,005	484	341

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Table VIII.—FRUIT-TREES *NOT* OF BEARING AGE.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.	Quince.	Apricot.
THE STATE, 1907	1,563,464	157,225	997,173	211,597	311,506	14,264	49,275
Allen	13,337	1,759	6,449	1,514	2,852	61	98
Anderson	19,139	2,035	6,999	1,525	3,105	87	226
Atchison	15,909	1,225	5,517	758	2,001	19	6
Barber	13,658	1,197	19,036	1,344	2,881	25	1,443
Barton	10,886	1,243	8,347	1,992	3,043	47	289
Bourbon	17,050	2,177	6,595	2,753	2,866	60	59
Brown	15,350	1,200	3,598	720	1,085	8	57
Butler	27,587	3,210	14,660	2,685	4,175	88	1,016
Chase	9,184	855	3,533	668	1,526	28	194
Chautauqua	14,361	2,587	7,444	1,752	2,310	83	373
Cherokee	15,755	1,852	9,294	1,613	3,080	141	57
Cheyenne	3,788	279	2,637	2,685	3,115	4	103
Clark	3,375	158	2,832	328	1,290	35	360
Clay	16,414	1,102	11,470	1,186	2,505	23	314
Cloud	9,707	921	8,135	942	2,314	10	797
Coffey	38,915	2,703	17,628	3,177	3,773	94	353
Comanche	2,872	454	4,242	5,399	1,049	22	237
Cowley	41,480	4,071	20,333	3,525	5,518	196	1,157
Crawford	9,651	1,809	5,232	1,031	1,128	29	66
Decatur	5,676	851	31,275	3,231	5,290	10	509
Dickinson	12,686	1,401	10,259	1,309	3,684	29	734
Doniphan	44,776	4,486	14,017	2,022	3,315	17	125
Douglas	15,276	2,519	7,644	1,058	2,297	73	78
Edwards	5,062	801	6,878	1,342	1,993	18	243
Elk	12,825	1,218	7,297	2,610	1,887	56	248
Ellis	2,236	219	3,530	1,525	2,193	2	259
Ellsworth	9,294	1,101	8,086	1,461	2,855	69	314
Finney	2,326	332	4,583	2,700	2,020	5	69
Ford	4,083	934	11,037	3,352	4,898	13	960
Franklin	21,097	3,829	9,930	1,779	3,209	108	155
Geary	5,175	683	3,083	505	1,133	17	47
Gove	3,847	642	7,108	6,944	1,946	50	479
Graham	5,918	675	22,771	3,578	3,309	23	641
Grant	31	4	347	122	346	.....	105
Gray	949	181	2,873	1,661	1,358	.....	125
Greeley	620	63	826	530	705	1	19
Greenwood	36,934	2,556	10,069	2,749	3,876	126	232
Hamilton	1,066	55	2,521	2,499	901	18	212
Harper	23,518	2,416	17,579	2,587	4,799	90	1,665
Harvey	16,751	1,563	8,976	1,068	1,789	102	674
Haskell	554	45	1,670	499	472	2	44
Hodgeman	1,088	134	2,709	900	968	28	196
Jackson	17,425	1,604	11,039	1,557	2,418	49	133
Jefferson	42,603	2,733	10,795	1,290	3,025	100	160
Jewell	18,308	3,081	25,799	3,122	5,523	129	1,330
Johnson	24,282	3,191	6,465	2,170	4,380	42	46
Kearny	1,729	61	5,055	1,086	639	7	218
Kingman	27,113	2,810	15,331	2,198	4,322	120	1,523
Kiowa	3,696	562	9,457	1,164	2,387	7	928
Labette	17,918	4,994	10,877	2,877	4,837	136	110
Lane	4,518	491	4,704	3,264	1,933	31	69
Leavenworth	29,973	3,486	8,390	1,713	2,953	158	170
Lincoln	11,112	908	7,979	1,984	2,500	19	683
Linn	35,674	3,698	10,159	2,816	4,407	140	156
Logan	2,484	363	3,493	1,662	2,594	3	275
Lyon	23,719	3,624	8,696	1,279	2,637	385	301
Marion	12,300	1,159	6,161	992	3,102	13	4,295
Marshall	14,595	1,238	17,304	1,367	2,858	5	294
McPherson	11,536	1,061	5,967	1,080	3,553	88	1,507
Meade	3,320	378	10,484	1,368	2,934	17	369
Miami	31,786	4,043	11,213	3,816	5,164	132	152
Mitchell	7,044	292	8,331	826	1,609	66	315

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FRUIT-TREES *NOT* OF BEARING AGE, 1907—CONCLUDED.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.	Quince.	Apricot.
Montgomery	16,297	4,971	13,049	2,399	3,165	157	259
Morris	11,329	972	5,230	634	1,657	27	260
Morton	79	2	296	207	140	.....	15
Nemaha	14,668	778	8,011	914	1,803	27	103
Neosho	13,116	1,902	9,235	1,719	2,159	65	94
Ness	5,131	438	9,377	6,630	4,277	39	791
Norton	7,129	597	26,019	3,681	6,068	18	1,551
Osage	22,578	2,666	10,752	1,189	4,493	119	229
Osborne	10,743	979	16,475	1,882	2,826	42	380
Ottawa	8,543	712	6,354	573	1,671	14	324
Pawnee	7,044	1,052	6,282	2,014	3,018	38	424
Phillips	15,984	798	28,688	2,697	6,361	35	1,633
Pottawatomie	13,211	1,250	8,665	1,980	2,205	38	253
Pratt	9,077	1,110	15,172	2,368	5,129	17	1,016
Rawlins	4,422	311	3,432	792	2,449	93	132
Reno	116,704	4,114	31,137	2,874	7,300	112	2,532
Republic	14,602	1,067	12,056	1,440	2,548	12	447
Rice	15,308	1,129	8,605	1,169	3,292	38	411
Riley	16,286	1,184	5,714	1,127	2,180	21	170
Rooks	7,910	917	21,246	2,714	3,983	19	478
Rush	3,666	577	4,341	2,234	2,592	4	698
Russell	5,444	600	7,759	1,079	2,166	27	290
Saline	8,140	493	8,993	1,743	2,451	37	356
Scott	1,928	205	5,383	3,160	2,587	5	688
Sedgwick	108,124	6,114	24,653	4,201	8,893	9,057	1,380
Seward	680	262	5,467	923	1,234	5	212
Shawnee	40,840	3,196	12,158	1,905	6,662	56	141
Sheridan	4,813	881	9,507	2,897	3,745	.....	260
Sherman	4,098	577	4,455	2,659	2,172	7	122
Smith	12,987	623	18,500	1,986	4,179	18	1,453
Stafford	13,931	1,466	7,471	1,355	3,189	60	452
Stanton	162	8	258	230	287	.....	17
Stevens	1,701	73	3,009	571	622	.....	25
Sumner	56,105	3,254	12,739	2,462	4,482	62	1,129
Thomas	2,502	424	6,784	2,627	3,858	4	261
Trego	2,094	321	3,353	5,174	1,520	1	104
Wabaunsee	15,954	1,935	6,613	1,059	2,700	53	804
Wallace	597	51	1,988	886	539	1	82
Washington	15,106	1,466	11,752	872	2,626	38	254
Wichita	688	50	794	273	320	.....	139
Wilson	16,769	1,664	7,044	1,363	2,108	104	99
Woodson	10,479	994	4,198	904	1,607	60	118
Wyandotte	36,169	7,715	27,436	5,807	15,769	170	67

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Table IX.—ACREAGE AND PRODUCT OF SMALL FRUITS.

Product of 1906. Acreage is for 1907.	Strawberries.		Raspberries.		Blackberries.		Gooseberries.	
COUNTIES.	Acres.	Crates.	Acres.	Crates.	Acres.	Crates.	Acres.	Crates.
THE STATE	4,222	178,733	2,396	72,218	5,474	304,066	695	15,869
Allen	71	2,383	12	196	129	8,692	4	168
Anderson	30	926	20	505	78	4,115	10	156
Atchison	28	1,855	17	952	41	5,035	1	9
Barber	2	40	2	1	9	80	3	6
Barton	5	260	2	164	4	98	1	57
Bourbon	52	3,057	17	318	48	3,782	5	330
Brown	95	942	59	312	31	1,500	3	33
Butler	75	1,519	7	396	46	7,248	6	258
Chase	10	2,526	5	954	15	943	1	117
Chautauqua	31	814	6	61	163	4,392	3	200
Cherokee	545	7,322	29	1,012	114	3,434	8	68
Cheyenne	2	211	3	458	.....	.....	3	111
Clark	1	2	.....	2	.....	.....	1	23
Clay	17	1,314	3	135	3	241	1	32
Cloud	26	951	3	83	15	367	1	25
Coffey	76	4,733	27	469	163	4,971	4	227
Comanche	1	.....	.....	15	.....	.....	4	9
Cowley	168	3,367	21	453	415	9,597	11	222
Crawford	35	3,500	63	894	53	3,152	16	41
Decatur	1	350	.....	60	.....	.....	4	38
Dickinson	14	1,790	4	241	18	687	1	16
Doniphan	279	17,371	507	20,463	490	34,798	12	1,132
Douglas	51	3,807	57	2,199	78	2,821	2	354
Edwards	45	75	25	1	1	61	2	43
Elk	34	2,986	8	451	65	13,581	5	75
Ellis	2	.....	.....	.....	.....	.....	.....	2
Ellsworth	3	121	1	64	1	41	2	81
Finney	4	273	4	131	.....	3	8	28
Ford	8	342	7	21	1	37	5	73
Franklin	68	2,784	73	2,926	96	9,720	4	369
Geary	15	961	12	136	9	195	4	20
Gove	7	75	1	62	.....	2	1	55
Graham	8	11	4	23	1	1	3	130
Grant	.....	.....	.....	.....	.....	.....	.....	.....
Gray	.....	2	.....	2	.....	.....	.....	1
Greeley	.....	.....	.....	.....	.....	.....	.....	.....
Greenwood	30	1,139	16	187	134	3,526	10	85
Hamilton	.....	215	1	.....	.....	25	1	21
Harper	6	169	3	52	24	951	2	11
Harvey	22	1,242	38	237	61	1,886	11	121
Haskell	.....	.....	.....	.....	.....	.....	.....	.....
Hodgeman	1	155	.....	.....	.....	.....	1	2
Jackson	93	3,812	35	986	133	3,116	22	191
Jefferson	69	4,106	59	1,211	49	6,024	20	246
Jewell	8	466	27	52	17	29	7	116
Johnson	48	2,943	46	1,525	91	2,921	5	617
Kearny	.....	1	.....	2	.....	2	.....	4
Kingman	25	274	9	133	64	2,393	5	43
Kiowa	1	17	.....	.....	1	6	1	3
Labette	158	8,724	26	349	209	9,436	21	366
Lane	2	11	2	433	1	163	.....	6
Leavenworth	91	15,079	55	7,246	98	19,793	6	1,488
Lincoln	2	115	1	15	.....	13	2	13
Linn	47	2,056	17	383	186	12,865	8	116
Logan	1	2	.....	.....	2	.....	1	19
Lyon	95	3,216	34	762	125	2,964	11	102
Marion	13	541	5	99	8	431	9	137
Marshall	40	1,246	10	522	43	745	5	93
McPherson	21	489	71	129	16	1,226	6	139
Meade	5	3	1	1	1	.....	2	49

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ACREAGE AND PRODUCT OF SMALL FRUITS—CONCLUDED.

Product of 1906; acreage is for 1907.

COUNTIES.	Strawberries.		Raspberries.		Blackberries.		Gooseberries.	
	Acres.	Crates.	Acres.	Crates.	Acres.	Crates.	Acres.	Crates.
Miami	201	2,660	34	812	139	6,769	6	255
Mitchell	32	250	1	100	2	10	7	40
Montgomery	124	11,595	19	753	136	19,958	12	184
Morris	19	675	11	132	10	577	1	38
Morton	.....	.....	.....	.....	.....	.....	.....	.....
Nemaha	55	1,313	49	341	101	808	2	32
Neosho	165	8,912	19	349	243	13,520	14	92
Ness	1	46	.....	2	7	.....	2	21
Norton	12	69	4	65	2	.....	5	64
Osage	44	5,022	11	884	219	6,224	3	238
Osborne	22	159	3	4	1	30	1	10
Ottawa	23	1,088	4	88	28	722	1	.....
Pawnee	4	239	2	6	1	102	2	78
Phillips	24	11	3	1	2	15	8	93
Pottawatomie	37	1,341	42	460	35	1,086	6	692
Pratt	2	11	1	38	2	104	1	12
Rawlins	4	77	.....	.....	.....	60	1	1
Reno	37	1,329	21	1,459	155	8,485	100	62
Republic	59	1,611	7	493	8	433	7	388
Rice	7	1,158	13	89	54	739	2	34
Riley	27	3,760	15	582	11	772	4	95
Rooks	2	621	1	3	1	1	1	18
Rush	3	10	.....	6	2	14	1	28
Russell	2	135	1	112	.....	8	1	20
Saline	139	71	2	16	9	44	1	12
Scott	1	80	3	.....	.....	.....	1	44
Sedgwick	92	2,673	26	601	101	6,463	20	493
Seward	2	1	.....	.....	3	.....	2	10
Shawnee	212	6,170	109	1,540	132	5,159	7	127
Sheridan	9	76	1	44	.....	1	2	61
Sherman	1	118	1	.....	1	50	2	46
Smith	10	228	57	166	1	.....	4	60
Stafford	7	340	2	64	17	702	4	54
Stanton	.....	1	.....	.....	.....	1	.....	.....
Stevens	.....	.....	.....	.....	.....	.....	.....	.....
Sumner	17	339	24	350	65	2,640	2	139
Thomas	6	471	2	.....	1	6	3	86
Trego	1	2	10	10	1	150	1	1
Wabaunsee	15	2,110	132	232	41	855	2	1,041
Wallace	1	12	.....	3	.....	.....	2	26
Washington	27	957	8	192	11	296	16	287
Wichita	1	2	.....	.....	.....	.....	.....	.....
Wilson	40	6,628	53	1,232	248	30,536	7	355
Woodson	22	3,425	13	911	65	5,879	4	154
Wyandotte	126	10,356	237	10,803	269	12,738	132	1,831

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Table X.—VINEYARDS, GARDENS, FRUIT, VEGETABLES, ETC.

COUNTIES.	Acres, vineyards.	Eight-pound baskets of grapes.	Acres, gardens.	Sales, vegetables, 1906.	Value of all fruit, 1906.
THE STATE, 1907	7,418	1,002,279	31,175	$502,478	$3,286,973
Allen	169	7,919	222	$2,521	$47,643
Anderson	81	24,558	312	3,181	31,912
Atchison	228	13,850	167	3,527	46,962
Barber	23	3,626	116	1,499	14,763
Barton	28	1,664	159	2,184	23,985
Bourbon	54	13,243	149	290	23,514
Brown	84	6,520	180	2,139	52,434
Butler	86	11,990	226	1,700	53,918
Chase	49	6,355	249	1,646	18,640
Chautauqua	45	8,372	725	4,160	26,935
Cherokee	45	5,538	771	40,751	49,260
Cheyenne	21	.....	44	644	1,136
Clark	4	368	125	924	2,358
Clay	78	16,452	238	3,377	38,663
Cloud	37	7,426	157	892	25,762
Coffey	179	4,539	400	2,849	28,244
Comanche	28	600	58	2,690	7,360
Cowley	122	12,639	604	10,674	80,515
Crawford	45	5,240	260	8,520	26,235
Decatur	126	68	57	402	4,331
Dickinson	71	18,812	229	1,126	37,842
Doniphan	488	124,438	178	1,536	222,418
Douglas	93	8,221	497	6,156	46,572
Edwards	15	946	74	1,239	6,744
Elk	51	12,943	283	5,314	44,443
Ellis	9	.....	385	1,866	1,070
Ellsworth	19	1,702	257	4,143	11,424
Finney	14	6,506	134	10,313	18,906
Ford	17	565	2,117	2,087	7,754
Franklin	277	9,755	165	1,617	39,373
Geary	82	14,268	104	4,409	25,029
Gove	26	881	24	1,206	4,163
Graham	9	927	154	4,615	5,544
Grant	.....	.....	.....	.....	.....
Gray	2	74	4	35	828
Greeley	.....	.....	4	25	117
Greenwood	69	6,071	323	2,472	45,365
Hamilton	2	82	98	80	600
Harper	63	6,919	246	1,988	30,898
Harvey	47	9,147	363	3,228	42,888
Haskell	.....	.....	3	72	70
Hodgeman	3	43	31	422	1,140
Jackson	88	14,726	247	977	61,768
Jefferson	36	11,098	237	42	75,386
Jewell	36	2,514	2,295	754	35,103
Johnson	92	19,557	198	19,271	41,476
Kearny	4	275	46	509	5,315
Kingman	104	10,265	283	1,253	36,461
Kiowa	14	200	55	1,015	2,002
Labette	101	5,496	572	12,688	41,793
Lane	9	1,206	41	490	3,539
Leavenworth	667	33,819	382	11,210	91,625
Lincoln	14	1,223	118	960	14,401
Linn	55	6,863	128	657	58,346
Logan	57	412	70	1,331	1,810
Lyon	117	10,241	394	5,897	43,048
Marion	132	8,880	192	1,206	24,268
Marshall	97	22,497	489	1,300	58,670
McPherson	73	10,106	879	2,497	46,427
Meade	9	505	65	740	2,851

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VINEYARDS, GARDENS, FRUIT, VEGETABLES, ETC., 1907—CONCLUDED.

COUNTIES.	Acres, vineyards.	Eight-pound baskets, of grapes.	Acres, gardens.	Sales, vegetables, 1906.	Value of all fruit, 1906.
Miami	37	7,721	276	$1,648	$55,086
Mitchell	12	1,335	177	1,456	7,172
Montgomery	151	10,194	796	26,694	54,418
Morris	64	5,705	208	1,095	31,100
Morton	.....	15	.....	.....	500
Nemaha	179	22,258	187	3,384	59,054
Neosho	49	3,804	340	7,829	31,906
Ness	5	341	136	2,004	3,869
Norton	7	30	119	510	8,881
Osage	138	25,156	155	2,844	48,934
Osborne	6	442	1,328	257	13,853
Ottawa	26	3,964	283	1,587	27,752
Pawnee	15	1,275	148	2,592	7,723
Phillips	59	365	329	4,461	14,242
Pottawatomie	84	11,691	290	2,863	40,413
Pratt	11	4,251	69	780	8,108
Rawlins	24	.....	92	1,745	657
Reno	194	20,218	412	7,930	182,773
Republic	95	14,192	233	1,187	57,710
Rice	56	10,519	296	2,670	38,293
Riley	67	15,928	277	3,721	53,869
Rooks	6	266	68	2,369	13,027
Rush	6	173	147	789	4,618
Russell	6	871	174	871	9,304
Saline	65	8,186	223	2,691	25,889
Scott	1	189	48	684	537
Sedgwick	252	13,264	1,910	23,613	113,229
Seward	3	.....	25	.....	.....
Shawnee	178	46,184	1,282	59,657	103,440
Sheridan	27	139	79	759	2,178
Sherman	17	300	92	1,890	732
Smith	17	560	195	1,587	17,840
Stafford	37	6,279	108	2,103	15,762
Stanton	1	42	3	16	340
Stevens	10	.....	1	.....	2,190
Sumner	93	10,748	455	7,976	48,942
Thomas	7	.....	86	1,164	528
Trego	2	101	14	349	731
Wabaunsee	85	12,165	171	666	33,381
Wallace	2	10	44	899	1,169
Washington	121	17,873	394	647	42,498
Wichita	1	20	12	5	179
Wilson	34	3,546	160	3,581	27,747
Woodson	26	5,114	255	1,120	26,550
Wyandotte	553	183,695	1,500	100,519	207,800

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Table XI.—FRUIT GROWN IN 1906.

Counties.	Bushels.				
	Apples.	Pears.	Peaches.	Plums.	Cherries.
The State	6,378,008	89,217	2,092,074	92,590	98,761
Allen	89,984	1,459	20,301	1,254	460
Anderson	75,935	2,439	17,077	705	1,079
Atchison	172,680	1,656	19,083	603	1,037
Barber	7,870	149	12,497	217	322
Barton	15,283	236	17,371	495	1,190
Bourbon	66,702	1,074	16,479	1,652	267
Brown	193,134	1,094	34,548	2,319	2,108
Butler	87,459	1,521	42,435	645	624
Chase	39,852	1,376	10,903	608	395
Chautauqua	66,819	1,063	16,097	1,354	259
Cherokee	51,306	129	5,889	1,088	560
Cheyenne	266	2	202	181	195
Clark	1,060	64	3,077	14	37
Clay	61,706	584	33,065	442	995
Cloud	40,102	149	28,661	247	698
Coffey	82,818	872	13,324	774	757
Comanche	3,819	124	8,180	71	184
Cowley	149,915	6,102	47,176	2,065	1,353
Crawford	47,077	514	8,052	959	411
Decatur	2,308	52	3,383	44	1,099
Dickinson	76,972	947	51,768	1,012	1,427
Doniphan	402,475	5,255	57,028	2,321	3,172
Douglas	100,039	3,243	28,905	1,723	2,783
Edwards	1,479	186	11,003	999	535
Elk	115,547	2,575	20,119	2,885	342
Ellis	1,072	14	748	135	57
Ellsworth	12,523	112	15,607	347	846
Finney	5,528	95	5,828	3,200	1,596
Ford	257	6	11,533	307	569
Franklin	111,090	1,928	23,257	1,662	1,011
Geary	38,896	470	13,987	509	876
Gove	238	4	2,442	421	253
Graham	632	82	5,433	182	258
Grant	.....	.....	65	5	.....
Gray	219	.....	1,251	43	51
Greeley	.....	.....	14	34	10
Greenwood	108,908	1,905	20,[illegible]46	1,563	553
Hamilton	71	.....	[illegible]	.....	40
Harper	54,092	1,421	21,88[illegible]	1,096	715
Harvey	79,700	2,035	25,651	926	1,026
Haskell	.....	.....	135	.....	.....
Hodgeman	120	.....	1,809	84	77
Jackson	190,063	1,581	48,595	1,193	2,321
Jefferson	215,200	2,255	47,935	1,[illegible]95	2,018
Jewell	47,991	419	24,682	[illegible]8	2,527
Johnson	90,046	1,803	47,809	2,8[illegible]	3,242
Kearny	3,143	12	2,211	75	246
Kingman	45,288	628	20,967	876	1,738
Kiowa	257	25	8,423	8	49
Labette	32,991	1,521	11,026	1,045	824
Lane	1,171	2	1,637	387	234
Leavenworth	269,113	2,956	43,471	2,050	1,903
Lincoln	6,988	56	23,248	337	486
Linn	148,743	1,653	25,484	1,607	829
Logan	390	17	989	27	99
Lyon	105,831	2,172	19,461	827	[illegible]6
Marion	76,351	1,054	16,813	433	[illegible]
Marshall	189,213	533	45,893	867	2,[illegible]
McPherson	73,065	988	24,999	831	1,[illegible]
Meade	737	118	3,523	517	2

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FRUIT GROWN IN 1906—CONCLUDED.

COUNTIES.	Bushels.				
	Apples.	Pears.	Peaches.	Plums.	Cherries.
Miami	118,178	2,383	28,929	1,565	1,198
Mitchell	7,497	24	11,424	88	1,281
Montgomery	84,487	1,414	17,844	2,118	336
Morris	82,892	1,171	25,981	294	539
Morton	30	.....	462	20	10
Nemaha	277,902	435	55,049	1,058	2,592
Neosho	57,285	1,356	20,644	2,827	563
Ness	639	44	2,740	616	237
Norton	2,466	39	4,701	260	1,235
Osage	125,179	1,499	31,913	780	1,856
Osborne	6,570	32	18,509	829	458
Ottawa	20,279	183	27,873	580	727
Pawnee	4,839	399	5,879	862	417
Phillips	9,021	7	8,469	971	502
Pottawatomie	129,384	840	33,890	1,105	1,023
Pratt	3,070	106	15,867	147	364
Rawlins	594	.....	444	16	136
Reno	212,145	1,652	92,300	916	1,700
Republic	121,069	231	26,836	361	1,585
Rice	40,093	815	29,027	382	1,466
Riley	103,833	546	32,632	692	1,615
Rooks	2,223	8	11,556	141	609
Rush	983	80	4,003	616	449
Russell	3,515	70	10,220	305	959
Saline	29,439	190	22,303	310	726
Scott	151	.....	643	83	195
Sedgwick	195,324	3,826	45,761	2,975	1,869
Seward	10	.....	293	1	.....
Shawnee	193,590	1,721	78,123	1,797	6,208
Sheridan	285	1	1,497	56	242
Sherman	313	.....	91	185	59
Smith	18,429	87	18,935	255	846
Stafford	16,685	421	37,253	1,393	788
Stanton	.....	.....	275	30	4
Stevens	57	.....	4,121	10	1
Sumner	119,052	2,182	37,752	1,587	2,568
Thomas	61	1	239	44	248
Trego	114	.....	803	164	30
Wabaunsee	126,832	1,507	32,991	667	1,079
Wallace	268	3	807	568	97
Washington	147,442	383	36,627	400	1,106
Wichita	28	.....	918	28	20
Wilson	76,876	1,117	19,650	1,356	263
Woodson	48,618	629	13,610	688	428
Wyandotte	177,787	5,085	127,534	10,575	7,510

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TABLE XII.—RANK OF COUNTIES, 1907.

COUNTIES.	Bearing fruit-trees.							Acreage of small fruits.				
	Apples.	Pears.	Peaches.	Plums.	Cherries.	Quinces.	Apricots.	Strawberries.	Raspberries.	Blackberries.	Gooseberries.	Grapes.
Allen	31	26	57	33	72	27	72	17	30	16	16	10
Anderson	43	23	68	58	57	12	67	34	24	23	10	29
Atchison	20	36	56	75	43	42	37	35	26	33	19	6
Barber	65	58	52	67	71	56	23	57	40	44	17	53
Barton	59	55	42	64	14	58	25	54	40	47	19	49
Bourbon	41	41	65	20	75	32	95	22	26	30	15	41
Brown	14	19	32	12	18	45	66	11	8	35	17	27
Butler	12	18	16	23	38	25	9	16	35	31	14	25
Chase	51	57	71	86	81	43	34	49	37	41	19	43
Chautauqua	44	47	62	29	68	14	51	33	36	9	17	45
Cherokee	15	53	64	28	60	21	96	1	29	18	12	45
Cheyenne	88	96	102	90	89	.....	102	57	39	.....	17	54
Clark	83	88	89	101	94	65	73	58	.....	.....	19	66
Clay	45	54	26	74	36	52	30	44	39	48	19	30
Cloud	50	59	18	39	20	47	10	37	39	41	19	46
Coffey	22	20	44	58	54	17	58	15	19	9	16	8
Comanche	76	84	81	95	85	61	61	58	.....	.....	16	49
Cowley	8	8	9	3	9	3	14	5	23	2	9	15
Crawford	37	37	75	48	82	41	90	30	7	28	6	45
Decatur	73	69	60	76	10	65	53	58	.....	.....	16	14
Dickinson	30	5	13	52	17	34	6	46	38	38	19	31
Doniphan	3	2	20	14	27	37	52	2	1	1	8	3
Douglas	24	3	5	46	33	8	65	23	9	23	18	22
Edwards	74	68	72	55	65	53	57	26	21	50	18	57
Elk	38	31	58	11	66	22	68	31	34	24	15	42
Ellis	77	81	86	73	62	51	82	57	.....	.....	.....	62
Ellsworth	63	61	53	85	46	50	33	56	41	50	18	55
Finney	69	76	83	34	74	57	71	55	38	.....	12	58
Ford	80	77	63	72	45	55	28	51	35	50	15	56
Franklin	39	32	49	60	58	19	83	19	5	21	16	4
Geary	56	60	74	91	79	59	64	45	30	44	16	28
Gove	89	79	76	17	80	60	67	52	41	.....	19	51
Graham	78	80	61	69	59	62	50	51	38	50	17	62
Grant	104	.....	96	98	100	.....	104	.....	.....	.....	.....	.....
Gray	92	92	91	93	92	64	91	.....	.....	.....	.....	68
Greeley	103	102	105	99	99	.....	101	.....	.....	.....	.....	.....
Greenwood	19	25	46	18	56	10	55	34	27	13	10	32
Hamilton	94	94	95	83	95	61	85	.....	41	.....	19	68
Harper	53	34	36	32	29	13	16	53	39	37	18	36
Harvey	40	16	43	49	50	23	8	41	15	26	9	44
Haskell	.....	.....	93	104	104	65	100	.....	.....	.....	.....	.....
Hodgeman	91	87	80	80	84	58	46	58	.....	.....	19	67
Jackson	23	30	23	40	25	33	44	12	16	14	3	24
Jefferson	5	4	19	30	16	5	60	18	8	29	5	47
Jewell	29	52	1	25	3	2	5	51	19	39	13	47
Johnson	47	10	30	43	24	15	74	24	13	22	15	23
Kearny	70	95	90	61	91	58	69	.....	.....	.....	.....	66
Kingman	54	35	29	22	40	16	19	38	33	25	15	18
Kiowa	82	78	69	92	86	.....	59	58	.....	50	19	58
Labette	16	13	59	19	64	6	88	7	20	7	4	19
Lane	85	83	85	9	85	58	81	57	40	50	.....	62
Leavenworth	1	11	37	45	48	9	70	14	10	20	14	1
Lincoln	60	62	35	38	30	49	13	57	41	.....	18	58
Linn	27	27	51	13	34	17	78	25	26	8	12	40
Logan	87	86	94	96	90	66	77	58	.....	49	19	38
Lyon	11	12	45	37	53	8	38	11	17	17	9	17
Marion	71	14	38	62	32	37	2	47	37	45	11	13
Marshall	17	45	11	54	15	36	36	28	32	32	15	20

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RANK OF COUNTIES, 1907—CONCLUDED.

COUNTIES.	Bearing fruit-trees.							Acreage of small fruits.				
	Apples.	Pears.	Peaches.	Plums.	Cherries.	Quinces.	Apricots.	Strawberries.	Raspberries.	Blackberries.	Gooseberries.	Grapes.
McPherson	33	24	39	50	21	14	1	42	6	40	14	30
Meade	90	85	79	87	73	64	62	54	41	50	18	62
Miami	35	21	54	36	52	31	89	4	17	11	14	46
Mitchell	55	71	27	77	42	57	20	32	41	49	13	59
Montgomery	46	22	50	10	67	20	56	10	25	12	8	11
Morris	21	46	41	88	63	35	31	43	31	43	19	35
Morton	100	.....	104	105	103	.....	87	.....	.....	.....	.....	.....
Nemaha	13	33	66	44	12	30	29	21	12	19	18	8
Neosho	32	42	48	2	69	24	80	6	25	5	7	43
Ness	79	73	77	5	61	58	22	58	.....	46	18	65
Norton	72	75	24	78	22	.....	11	43	38	49	15	63
Osage	7	17	33	56	28	5	49	27	31	6	17	12
Osborne	61	56	15	79	26	46	24	41	39	50	19	64
Ottawa	58	63	28	82	49	51	32	40	38	36	19	51
Pawnee	64	49	70	21	31	31	47	55	40	50	18	57
Phillips	62	66	14	42	6	49	15	39	39	49	12	37
Pottawatomie	34	43	40	70	47	38	54	29	14	34	14	27
Pratt	67	64	25	7	35	4	26	57	41	49	19	60
Rawlins	84	97	97	102	88	54	76	55	.....	.....	19	52
Reno	2	6	3	4	2	18	3	29	23	10	2	7
Republic	18	28	8	41	13	46	17	20	35	45	13	21
Rice	48	43	34	63	23	39	18	52	29	27	18	39
Riley	36	51	47	51	51	48	48	36	28	42	16	33
Rooks	66	65	22	27	41	46	41	57	41	50	19	64
Rush	75	70	78	35	37	57	35	56	.....	49	19	64
Russell	68	72	67	89	55	54	42	57	41	.....	19	64
Saline	52	50	31	47	44	40	27	8	40	44	19	34
Scott	93	93	87	71	78	63	63	58	39	.....	19	69
Sedgwick	6	7	10	6	8	7	7	13	20	19	5	5
Seward	101	100	101	94	102	.....	99	57	.....	.....	.....	67
Shawnee	4	9	6	24	4	25	45	3	4	15	13	9
Sheridan	81	74	82	81	70	67	86	50	41	.....	18	50
Sherman	98	98	103	84	93	.....	94	58	41	50	18	56
Smith	42	67	2	8	5	53	4	49	9	50	16	56
Stafford	57	38	21	31	11	50	21	52	40	39	16	46
Stanton	102	101	100	97	98	.....	98	.....	.....	.....		69
Stevens	96	99	88	103	101	.....	103	.....	.....	.....		61
Sumner	28	15	17	26	7	26	12	44	22	24	18	22
Thomas	97	91	92	68	83	66	93	53	40	50	17	63
Trego	86	82	84	15	87	63	43	58	32	50	19	68
Wabaunsee	25	29	7	59	39	29	39	45	3	33	18	26
Wallace	95	90	99	65	97	67	92	58	.....	.....	18	68
Washington	9	44	12	57	19	44	40	36	34	42	6	16
Wichita	99	89	98	100	96	.....	97	58	.....	.....	.....	69
Wilson	26	39	55	16	77	11	84	28	11	4	13	48
Woodson	49	40	73	66	76	28	79	41	29	24	16	51
Wyandotte	10	1	4	1	1	1	75	9	2	3	1	2

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Table XIII.—FORESTRY STATISTICS.

Counties.	Street trees.	Wild timber.	Cultivated.				
	Number.	Acres.	Walnut, acres.	Locust, acres.	Cottonwood, acres.	Catalpa, acres.	Other varieties, acres.
The State, 1907	695,067	439,119	7,567	19,599	18,486	11,125	59,813
Allen	2,830	1,645	249	17	179	98	1,449
Anderson	5,097	8,960	31	2	2	165	502
Atchison	90	5,448	10	.....	10	2	286
Barber	70	4,972	275	1,052	212	26	2,508
Barton	18,789	892	33	287	616	47	419
Bourbon	.....	5,569	1	.....	1	49	10
Brown	3,016	8,997	90	9	62	22	611
Butler	4,373	10,840	56	12	163	49	428
Chase	3,536	6,794	13	2	1	10	1,048
Chautauqua	977	7,629	28	1	6	10	1,941
Cherokee	8,547	5,068	29	2	.....	661	252
Cheyenne	1,028	108	29	1,296	20	10	2,195
Clark	.....	419	.....	186	37	5	5
Clay	10,663	5,070	90	32	142	61	557
Cloud	564	4,490	58	16	146	27	486
Coffey	10,516	4,708	35	7	15	43	188
Comanche	300	1,146	3	388	323	20	22
Cowley	7,772	8,919	82	48	138	116	698
Crawford	14,287	4,140	8	.....	.....	448	115
Decatur	312	1,167	4	2,788	18	1	831
Dickinson	18,759	3,362	53	11	252	103	1,991
Doniphan	6,394	15,259	74	18	83	2	94
Douglas	3,051	7,014	29	1	3	.....	89
Edwards	428	101	50	146	412	55	308
Elk	5,111	11,518	1,251	1	24	20	237
Ellis	3,056	1,170	18	1,136	100	.....	544
Ellsworth	23,200	2,649	1	115	184	108	485
Finney	6,088	.....	7	57	43	42	53
Ford	1,582	372	154	1,692	352	25	539
Franklin	1,166	8,467	86	.....	4	8	21
Geary	4,916	8,180	45	7	38	5	36
Gove	16,308	25	7	38	118	1	249
Graham	5,733	776	19	36	474	2	810
Grant	.....	.....	.....	2	.....	.....	.....
Gray	15,179	1	.....	16	56	15	13
Greeley	.....	.....	.....	.....	.....	.....	.....
Greenwood	18,199	12,195	34	6	23	317	153
Hamilton	1,693	290	2	2	201	2	83
Harper	16,589	209	33	785	676	238	610
Harvey	15,375	360	71	13	716	41	530
Haskell	.....	.....	10	6	14	1	18
Hodgeman	155	61	.....	1,050	35	55	22
Jackson	7,004	8,656	6	3	3	34	170
Jefferson	8,966	19,051	2	.....	.....	211	365
Jewell	3,774	12,055	417	182	595	20	20
Johnson	3,313	2,973	289	1	26	668	668
Kearny	6,637	17	5	31	96	5	33
Kingman	23,135	65	154	317	710	368	1,162
Kiowa	565	198	.....	486	26	466	466
Labette	6,231	6,830	43	3	30	14	370
Lane	877	41	1	40	105	25	43
Leavenworth	1,758	16,228	30	14	3	.....	343
Lincoln	1,812	1,565	38	77	56	.....	387
Linn	6,716	10,777	83	26	10	122	259
Logan	274	141	.....	1,672	401	6	77
Lyon	3,455	4,660	17	5	51	51	498
Marion	22,208	1,149	129	77	218	195	2,958

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FORESTRY STATISTICS, 1907—CONCLUDED.

COUNTIES.	Street trees.	Wild timber.	Cultivated.				
	Number.	Acres.	Walnut, acres.	Lucust, acres.	Cottonwood, acres.	Catalpa, acres.	Other varieties, acres.
Marshall	8,608	17,573	28	8	63	77	448
McPherson	21,057	2,302	152	25	501	46	1,412
Meade	4,991	208	9	186	172	54	230
Miami	906	10,357	47	.....	1	4	35
Mitchell	4,410	3,205	56	164	163	19	808
Montgomery	4,391	4,239	53	1	2	.....	134
Morris	6,416	4,996	30	.....	26	74	357
Morton	.....	.....	.....	3	.....	.....	1
Nemaha	7,303	11,658	79	12	12	31	1,345
Neosho	816	4,940	21	6	5	74	464
Ness	474	129	21	414	67	22	402
Norton	5	2,215	70	197	1	.....	369
Osage	13,025	6,875	66	336	21	49	503
Osborne	24,249	4,882	101	180	163	16	297
Ottawa	6,907	2,879	62	1	278	22	319
Pawnee	46,231	736	57	110	335	64	1,120
Phillips	3,338	3,632	45	53	179	6	735
Pottawatomie	3,717	15,103	19	.....	50	9	500
Pratt	9,487	.....	33	25	111	34	287
Rawlins	2,201	705	7	68	240	2	86
Reno	7,094	315	257	335	2,014	3,443	6,292
Republic	7,885	5,585	38	34	539	150	3,098
Rice	26,217	707	90	48	619	204	1,255
Riley	3,640	9,616	69	.....	54	4	84
Rooks	4,084	1,162	71	389	532	29	848
Rush	6,187	977	63	276	210	11	206
Russell	3,048	1,395	10	59	24	.....	140
Saline	2,228	2,106	63	17	171	13	587
Scott	663	4	16	50	8	1	2
Sedgwick	8,930	2,490	208	946	946	145	1,408
Seward	.....	.....	2	131	11	14	57
Shawnee	25,651	8,660	184	18	18	67	142
Sheridan	20	12	.....	20	65	3	133
Sherman	12	51	.....	27	.....	.....	87
Smith	20,415	5,194	172	40	64	7	597
Stafford	5,058	14	108	145	1,138	152	1,196
Stanton	64	2	.....	7	.....	.....	13
Stevens	10,102	.....	.....	227	7	2	27
Sumner	14,355	11,839	61	341	225	153	487
Thomas	1,762	44	7	59	.....	1	186
Trego	582	.....	16	74	50	.....	23
Wabaunsee	5,391	11,518	64	1	18	415	68
Wallace	.....	19	1	2	1	.....	4
Washington	8,250	9,313	29	7	128	49	788
Wichita	2,740	.....	.....	88	2	14	2
Wilson	7,211	5,163	271	15	22	40	1,912
Woodson	6,776	8,843	289	232	952	510	737
Wyandotte	796	4,075	240	5	49	.....	287

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SUMMARY

OF HORTICULTURAL STATISTICS FOR 1906 AND 1907.

FRUIT-TREES.		1906.		1907.	
		In bearing.	Not in bearing.	In bearing.	Not in bearing.
Apple	number.	6,656,144	1,627,331	6,610,597	1,563,464
Pear	"	243,133	147,166	249,906	157,225
Peach	"	4,624,412	1,052,998	5,275,824	997,173
Plum	"	633,954	192,139	681,588	211,597
Cherry	"	653,301	288,339	694,959	311,506
Quince	"	9,684	4,738	10,504	14,264
Apricot	"	190,843	49,049	169,833	49,275
Total	number.	13,011,471	3,361,760	13,693,211	3,304,504
Not in bearing	number.	3,361,760	.....	3,304,504	
Grand total of all fruit-trees	number.	16,373,231	.....	16,997,715	

BERRIES AND GRAPES.		1906.	1907.
Strawberries	acres.	3,669	4,222
Raspberries	"	2,217	2,396
Blackberries	"	4,583	5,474
Gooseberries	"	788	695
Total	acres.	11,257	12,787
VINEYARDS	acres.	8,781	7,418
Grand total	acres.	20,038	20,205
VEGETABLE GARDENS	acres.	26,218	31,175

FRUIT GROWN.		1905.	1906.
Apples	bushels.	2,450,808	6,378,008
Pears	"	18,731	89,217
Peaches	"	77,274	2,092,074
Plums	"	35,523	92,590
Cherries	"	33,470	98,761
Total	bushels.	2,615,806	8,750,650
SMALL FRUITS:			
Strawberries	crates.	197,878	178,733
Raspberries	"	43,914	72,218
Blackberries	"	92,481	304,066
Gooseberries	"	7,150	15,869
Total	crates.	341,423	570,886
GRAPES	baskets.	603,257	1,002,279
Total value of fruit		$1,568,172	$3,286,973
Total value of vegetables		400,903	502,478
Grand total value of all horticultural products		$1,989,075	$3,789,451

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